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Abstract

This paper looks at one of the major contributor to low overall employment rate in Hungary, the very low activity of the elderly. Although there are scattered pieces of evidence about the social security system in general having substantial influence on incentives and activity, the actual mechanisms are not well documented. Examining the incentive structure of the Hungarian old-age and disability pension system reveals that it provides very little to no incentive for extending active working life. Retirement through either of these pensions was and in 2006 still is an accessible exit route from the labour market that provides a minimal but secure income flow. For those reaching the minimum legal retirement age, retirement is so attractive compared to staying in the labour market that most of the working individuals retire. I use a simple model to estimate the incentives affecting the decision to retire before the legal age. Results from binary decision models estimated on household panel data support the hypothesis that incentives provided jointly by the labour market and the pension system make retirement very attractive, especially for those with bad labour market prospects. Accepting that this system was necessary to "mop up" excess labour supply in certain segments of the labour market (such as that of the extremely low-skilled individuals), it is not clear from a purely efficiency point of view why such a system is still in operation in 2006. (Remark: the government is planning to reform the system during 2007)

JEL: J22, J26, J14, C34

Keywords:

Time Allocation and Labor Supply, Retirement; Retirement Policies, Economics of the Elderly; Economics of the Handicapped, Truncated and Censored Models

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Inaktivitás Magyarországon: a nyugdíjrendszer tartós hatása

Cseres-Gergely Zsombor

Összefoglaló

A tanulmány az alacsony magyarországi aktivitás egy kiemelkedően fontos forrását, az idősödő emberek munkakínálatát vizsgálja. Noha vannak mozaikszerű ismereteink arról, hogy társadalombiztosítás szolgáltatásainak milyen jelentős hatása van a munkapiaci viselkedésre, ennek mechanizmusai jórészt nem dokumentáltak. Ha alaposabban szemügyre vesszük a magyarországi rokkant és időskori nyugdíjak folyósításának rendszerét, világossá válik, hogy az a vizsgált időszakban semmiféle késztetést nem adott a munkával töltött életszakasz meghosszabbítására. Ezeken a csatornákon át a vizsgált időszak egészében, és még 2007-ben is lehetőség nyílik arra, hogy sok munkaképes ember hagyja el a munkapiacot viszonylag szerény, de biztos jövedelem reményében. Azok, akik elérik a nyugdíjba vonuláshoz szükséges legalacsonyabb korhatárt, szinte kivétel nélkül élnek is a lehetőséggel, az annyira kedvező. Ennek megfelelően a tanulmányban azt modellezem, hogy milyen motivációknak lehet szerepe a nyugdíj korhatár előtti igénybe vételében. A panel adatokon becsült diszkrét modell eredményei megerősítik, hogy a munkapiac állapota és a nyugdíjrendszer együttesen igen kedvező lehetőséggé teszik a nyugdíj igénybe vételét, különösen a kedvezőtlen munkapiaci helyzetben levők számára. Elfogadva, hogy a rendszer jelenlegi formájában szükséges volt a munkapiac bizonyos szegmenseiben keletkezett munkaerő-felesleg felszívása érdekében (amilyen az idősebb és képzetlen embereké), nem világos, hogy miért hatékony egy ilyen rendszer működtetése még 2006-ban is. (Megjegyzés: a rendszer átalakítására a kormányzat 2007 folyamán lépéseket készül tenni.)

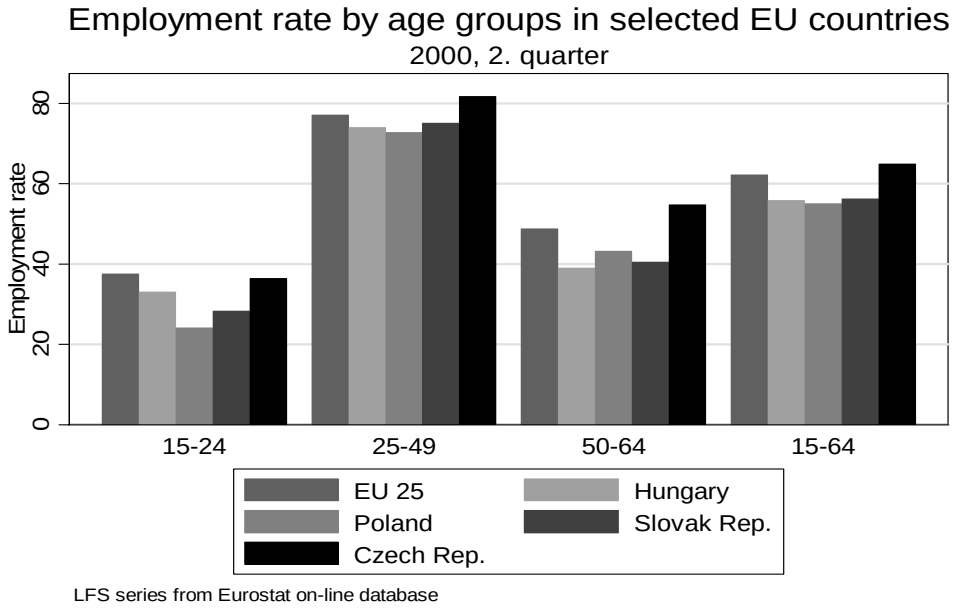
Tárgyszavak:

munkakínálat, korai nyugdíj, szelekció

INTRODUCTION

Employment rate of the working-age population is low in Hungary compared to the EU average. In 2000 – the first year comparable data exists for all countries we look at – employment rate in Hungary falls short of the EU25 average by 6 percentage points. With the exception of the Czech Republic, other new member states seem to experience a similar situation in terms of employment.

Figure 1:



LFS series from Eurostat on-line database

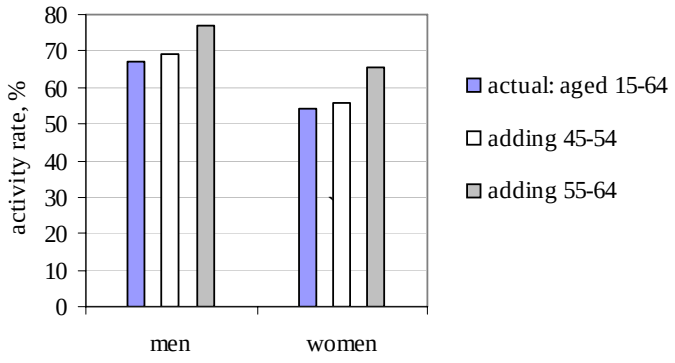
A number of papers have been written on the labour market situation in transition economies, starting with the seminal contribution of Aghion and Blanchard (1994). For a long time, all these papers were concerned about was employment and unemployment. In reality however, as recent studies, such as that of Boeri (2001) notes, the loss in employment was absorbed not by unemployment, but also by inactivity. Sooner or later a great proportion of the jobless have left the labour market either with or without an intervening period of unemployment. Although no detailed flow-based analysis of this process is available up to now in the case of Hungary, Köllő (2005) gives a compelling argument for this using stock data with retrospective information on non-employment spell durations. Comparing actual duration distribution with the theoretical one of a steady-state economy, he finds a huge lump of people losing their job around the transition in 1990 and not finding a new one ever since. The overwhelming majority of those individuals are inactive.

Looking at employment by age groups in Figure 1 reveals that we see the greatest cross-country difference in the eldest age group, those between 50 and 64 year of age. Clearly not the only source of the low employment rate, inactivity of the aged is an important contributor

to the observed pattern. However, to support inactivity, there must be a secure and in some ways sufficient income source for elderly people. This source is different in different stereotypically inactive groups. The young inactive are often students, relying on parental transfers, young mothers receive maternity benefit, the disabled receive disability benefit (or, as it is called in Hungary, a disability *pension*), while the aged receive old-age pension. Pension however is in several countries not connected to disability and old-age only, but serves also as a well-documented exit-route from employment (see Herbertsson, 2001, for theoretical considerations and Peters et. al, 2004 for an overview of policies and their impacts in the EU). Indeed, some 42 percent of all inactive in the 15-64 age group received some kind of pension in 2001, which increases to 67 percent in the 25-64 group.

A simple calculation shows that if the activity rate of the age group 45–54 were in line with that of the 40–44 age group, the overall activity rate of the population aged 15–64 would be about two percentage points higher. If a similar proportion of people aged between 55 and 64 were present in the labour market, the activity rates among men and women would be a further 7–10 percentage points higher (see Figure 2). The involvement of women aged between 55 and 64 would result in the largest increase in economic activity. On the basis of these calculations, the activity rate for the two sexes combined would be 62.4% and 71.2%, as against 60.5% in 2004. We can safely conclude that if one is concerned with the employment situation in Hungary, looking at the workings of the pension system is highly relevant. In what follows, I shall look at different aspects of the interaction between the pension system in general and employment.

Figure 2: Actual (year 2004) and hypothetical activity rates



Source: Cseres-Gergely – Scharle (2006); Authors' calculations based on 2004 Labour Force Survey data.

Firstly, I discuss the nature of correlation between pensioner status and economic activity and the surrounding issues. We shall see that although there is no "law" (either real or observed) that would say that the pensioners should not work, in most cases they actually do not. This experience is not unlike what we find in international comparison. An important difference is however that the legal retirement age in Hungary is lower than the EU average,

effectively depressing employment. An important caveat applies to all subsequent: health conditions might affect results heavily, but using currently available data, these are very difficult to take into account. They also point to an important area of research.

Secondly, I discuss the institutional setting in which decisions about retirement are made in Hungary. The main finding is that for those unsure about labour market prospects, the retirement system provided an attractive escape route at a relatively early in their working life, and gave no incentive for work at the same time. The greatest problem seem so be that it is not only the legal age that is low in Hungary, but the also the actual mean retirement age, which is actually even lower.

Thirdly, I look at the role of pension systems in transition economies. Based on a stylised life-cycle model of participation, I argue that the option-value model of retirement can and also has to be adapted to transition economies. Finally I estimate a suitably simplified version of the model using Hungarian data. Estimation results show that economic incentives do have an effect on early retirement, even if it was officially labelled as disability retirement. I also find some evidence showing that the pension system is selective in the sense that the relative benefit, or expected replacement rate – based on future earnings – is higher for those with bad labour market prospect. This results is similar to those found earlier in the case of the unemployment benefit system.

EMPLOYMENT AND PENSIONER STATUS IN HUNGARY

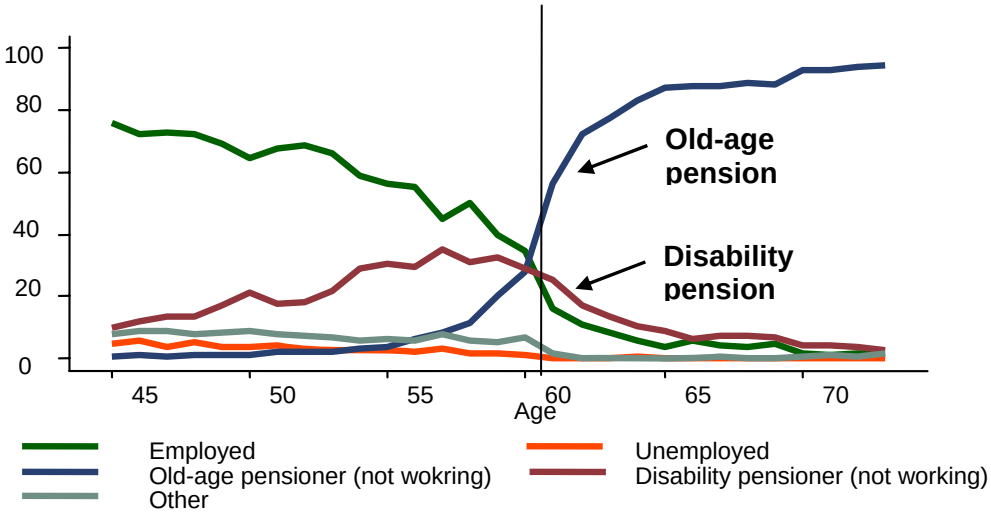
Before going any further, it is useful to elaborate on the observed correlation of activity and pensioner status in Hungary. Previously I presented some evidence to support the claim that not only do pensioners make up a substantial part of the inactive, but also that large part of the pensioners is inactive, too. Here I took a little closer look at the details of retirement.

Age is correlated with many changes over the life-cycle affecting an individual's labour market performance. To look at an approximation to this correlation, I use Hungarian Labour Forces Survey (LFS) data to create cross-section age-activity "profiles". The resulting picture is shown in Figure 3 for Hungarian men in 2001. The graphs combine inactivity and pensioner status to show the proportion of men on either retirement or old-age pension not working versus other groups in the population past 45 years of age (women are left out due to slightly different pension regulation).

Figure 3: Age-activity profiles of males in Hungary in 2001

Hungary

Great Britain



Source: Own calculatioins from quarter 2 of the 2001 Hungarian LFS

It is quite evident that the proportion of workers start declining, whereas the proportion of disability pensioners start picking up after passing the 45 year mark. The next great change happens around the age of 60, when old-age pension takes the lead, employment drops dramatically, and the share of disability pensioners start declining. As we shall see, the abrupt increase of the share of old-age pensioners is clearly an effect of regulation: men can claim pension normally from the age of 62 (quite frequent exceptions lower the actual mean retirement age substantially). The opportunity for retirement seems to act as if it was almost mandatory to finish the career. On the other hand, the rise starts 2-3 years earlier, and there is no such clear "law" for the doubling of the share of disability pensioners.

One might wonder whether the observed regularities are unique to Hungary. The answer is a definitive "no". Blundell (2002) presents similar profiles for Great Britain and the Netherlands, which in turn show similar regularities. The effect of the legal retirement age is visible in the case of both countries, albeit – in line with regulations – shifted towards older ages. The share of inactive disability benefit recipients increase in a similar fashion, too. Although both economies are much more advanced than the Hungarian, there are important similarities in the collapse of heavy industry and the extensive nature of social benefits, respectively.

STYLISED FACTS ON RETIREMENT FROM FLOW DATA

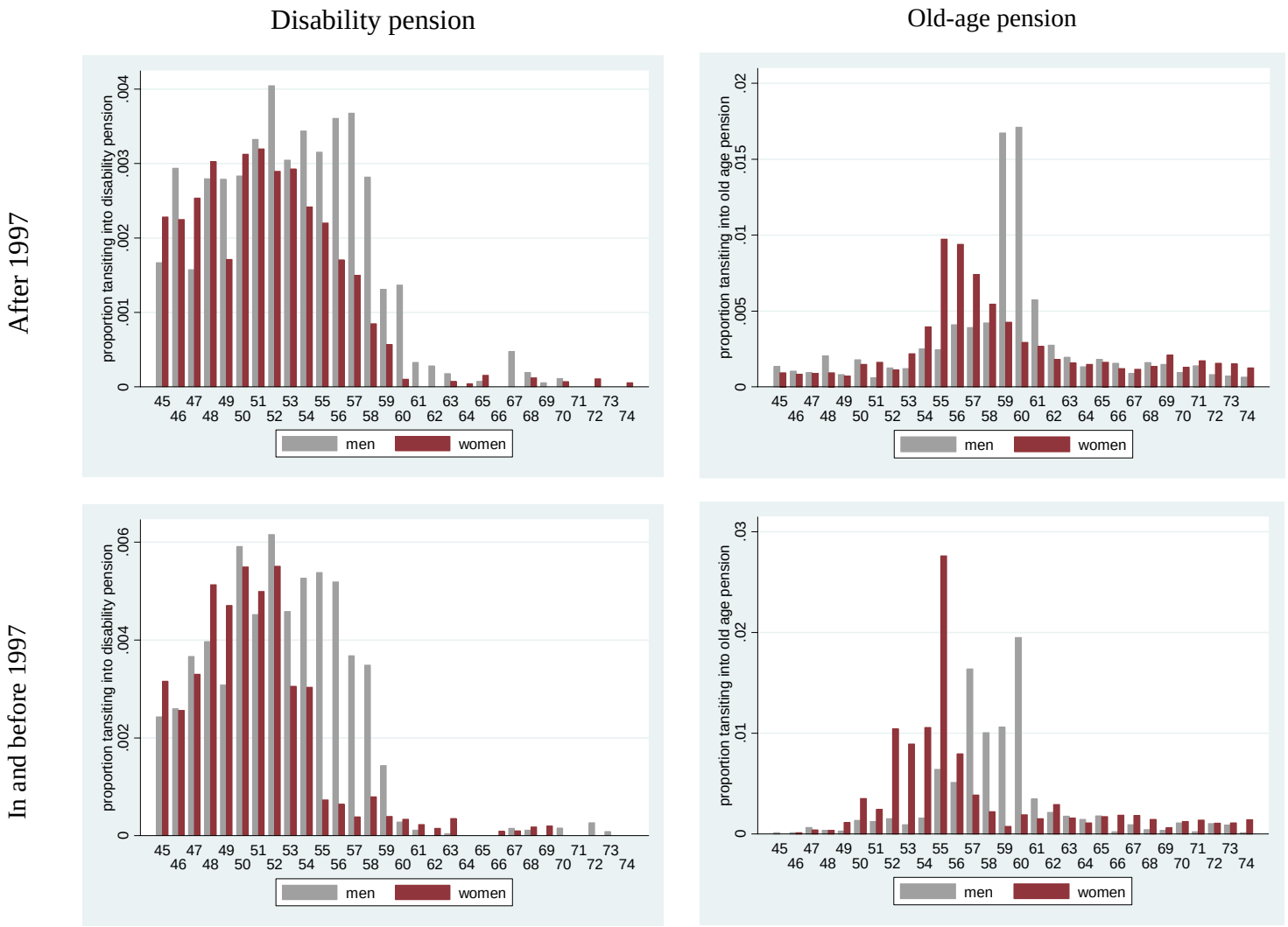
Cross-section profiles can be misleading when one is interested in the timing of retirement as they are not based on actual retirement flows, and thus reflect a cumulative effect of events that happened in the past. This is especially problematic in times when regulation or the whole economy changes, as it did after 1997 and during the early years of the transition. In the case of old-age pension, the legal retirement age rose, whereas in the case of disability

pension, some of the eligibility regulations were tightened from 1997 on (see more on this later). To get a flow equivalent of the age-retirement profiles, I used 2 period panels from the Hungarian LFS and looked at those who became pensioners from one quarter to the other.[1] The panels were stacked in the 1992-1997 and in the 1997-2004 period, to increase the precision of the estimates. Figure 4 shows the distribution of retirement ages in the two regimes.

The profiles have a shape similar to what we have seen from the cross-section. Once we know that the legal ages are 60 for men and 55 for women until 1997, it is easy to observe that actual old-age retirement ages peak right at those ages in the first period, with a few retirements after that (note the differences in scales). Despite of this regularity, there is a substantial outflow to retirement already before the legal ages, comparable in magnitude to what we see in the case of disability pension. After 1997, a slight shift is apparent, along with an increase in the dispersion around the mode. All in all, it seems to be safe to note that people retire as soon as possible. Disability pensioners' transitions seem to tell a similar story, again supporting the conjecture coming from the cross-sectional data. Inflow to disability pension is in full swing from 45 years age on, peaking at about 5 years before the legal age for old-age pensions.

[1] It would be also important to look at the correlation between retirement and inactivity in a flow framework. Although practically this is possible, the short panel, lack of rich retrospective information and the widespread practice of taking sick-leave before retirement make such an analysis difficult and uninformative in many cases.

Figure 4: Empirical retirement age distributions in Hungary for old-age and disability pensioners before and after the pension reform of 1997 (calculations from LFS microdata)



Source: Own calculations form the LFS. Two quarters are merged to form a panel from 1992Q1 to 2004Q3. Data are weighted and averaged over two periods, from 1992 to 1997 and 1998 to 2004.

THE PENSION SYSTEM AND ITS POTENTIAL EFFECTS ON THE LABOUR MARKET

We have seen previously that most people in Hungary seem to retire as soon as possible and exit the labour force at the same time. In this section, I supply evidence to claim that the pension system itself has contributed to low elderly employment. In order to see why this can be so, I give a short description of the incentive structure of the pension system in Hungary. There are detailed descriptions available of the system itself (such as the one found in Burns and Cekota (2002) or recently Simonovits (2006), focusing on the 1997 reform of the system), with which I have no wish to compete. I merely highlight the most important factors that shape the incentives to claim pension and work beside that.

OLD-AGE PENSION

The Hungarian old-age pension system is basically a pay as you go system with a funded pillar from 1997 receiving up to 6-7-8 percent of gross wages from 1998, while the remaining 25-24-23 percent flows into the first pillar. Beside the introduction of a funded pillar, the year 1997 brought about two important changes. Firstly, before 1997, pension was calculated on the basis of the last few years' wages using a specific formula that introduced a correction changing every year ("valorisation"). Since 1992, pension is calculated on the basis of wages for employment back to 1988. Before 1996, the earliest legal retirement age was 55 years of age for women and 60 for men. After 1996, both of these ages have been gradually increasing to 62 years of age, in one and two year steps, respectively. Men reach the new legal age already in 2001, while women do so only in 2009. The legal retirement age in 2001 was 62 years for men and 58 for women.

As legal retirement ages increase after 1997, there is an important exception during the transition, covering almost every new retiree. With a sufficiently long work history, it is possible to take advantage of a scheme what I suggest to call "transitional early retirement" without deduction from the pension, which is available 3 years before the legal age, at the former legal age the earliest. For this type of early retirement the conditions are exactly the same as for normal retirement (except for the work history requirement), ie., there is no penalty involved. If the employee does no have the necessary work history, early retirement is still possible, the difference being a 0.1 percent decrease in the pension for every month in the first year, 0.2 percent for every month in the second year, and so on. For example, in 2001 a woman can retire through old-age retirement if she is at least 55 year old. With the required work history (38 years of service), she can retire without a deduction in her pension. If she does not have this work history, she either has to accumulate more years and retire later (also facing the fact that the legal age is increasing) or forgo part of her pension. Supposing that

she has 2 years less than required, she can retire with a 2x12x0.2= 4.8 percent penalty. Table 4 and 5 contain important data on retirement from official registers, not available fro surveys. Table 4 shows that accumulated work experience was sufficient in the case of most elderly, therefore the effective retirement age did not change between 1997 and 2002. The two-year cycles generated by the rising of the legal retirement age in female retirement are apparent, too.

Table 4: Distribution of retirees according to forms of old-age pension claimed

Men	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*
Retirements after the legal age	**13.4**	**6.8**	**5.0**	**4.8**	**2.0**	**0.9**
With bonus	6.7	4.5	3.2	3.0	1.0	0.5
Without bonus	6.7	2.3	1.8	1.8	1.0	0.4
Retirement at the legal age	**77.9**	**1.9**	**14.8**	**2.6**	**6.2**	**8.1**
Retirement before the legal age	**8.7**	**91.4**	**80.1**	**92.6**	**91.8**	**91.0**
Pure pre-retirement	1.1	1.1	1.2	1.6	0.9	0.8
Tr. Early retirement without deduction	7.3	85.7	75.0	84.9	86.2	85.1
T. Early retirement with deduction	0.3	4.6	3.9	6.1	4.7	5.1
Together (number, 100%)	**10,729**	**9,092**	**11,914**	**12,749**	**23,684**	**20,747**

Women	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*
Retirements after the legal age	**23.5**	**11.1**	**4.5**	**3.7**	**6.5**	**2.8**
With bonus	22.1	10.6	4.1	3.4	6.1	2.6
Without bonus	1.4	0.5	0.3	0.3	0.4	0.1
Retirement at the legal age	**4.3**	**0.0**	**21.9**	**1.8**	**32.8**	**1.2**
Retirement before the legal age	**72.1**	**88.9**	**73.6**	**94.5**	**60.7**	**96.0**
Pure pre-retirement	0.6	0.3	0.2	0.1	0.2	0.1
Tr. Early retirement without deduction	66.7	83.1	68.9	85.8	55.8	88.9
Tr. Early retirement with deduction	4.8	5.5	4.5	8.6	4.7	7.0
Together (number, 100%)	**16,170**	**14,922**	**21,765**	**25,325**	**11,675**	**17,912**

Table reproduced from ONYF (2004), page 17

As opposed to the penalty for insufficient work experience, there is basically no bonus for retirement later than the legal age until 2004. Although a 3.6 percent increase is available after the first year of the legal retirement age, the transitional regulations do not play a part here. The bonus is thus not extremely large and even most men would have to work for an extra 3 year after the first possible opportunity for retirement (60). Women would have to

work an extra 8 years if otherwise qualified for early retirement in 1997.[2] Although one would think that this option is as good as absent, Table 4 also shows that retirement after the legal age was non-negligible before 2000, but it decreased to almost zero thereafter. We do not know the age distribution of "late retirees", there is no clear-cut explanation for this change. The high proportion of those retired with bonus shows nevertheless, that most of them remained in the labour market for a fairly long time. Late retirement in an environment which does not give incentives for it is an interesting question to look at, as we do not expect the average person to work for the pure passion of it. Unfortunately, as we shall see later, this proves to be very difficult to look at because of the lack of appropriate data.

Being the dominant form of old-age retirement, transitional early retirement is worth a closer look. Table 4 shows details on this form of retirement both with and without deduction (first and second columns for every year, respectively). Firstly, note that there is only a fraction of those who retire early with deduction from their pension (first column). Secondly, if there is one, the deduction is quite substantial (as so is the shortfall in the length of labour service). Maternity and child care leave is accounted as "labour market service", but it is apparent that women experience much larger deductions than men. Although we do not see behind these aggregate numbers, as a general rule, it seems to be the case that people are willing to retire at the earliest age possible, some even at quite substantial expenses.

Because the entry pension formula is not linear, it is difficult to say what exact replacement rate the old-age pension provides.[3] A further complication is that the formula changed over time, leaving some cohorts better, others worse off. ICSSZEM (2005) shows both theoretical replacement rates and empirical ones for the year 2005 and beyond (although methodology for the latter is not clear). This time period is ahead of the one we are looking at here, but it is valid for the entire post-1997 period, as rules remain the same.

Theoretical rates for internationally comparable pensioner types (by the EU SPC/ISG - Indicators Sub-group of the Social Protection Committee of the EU) are in the range between 90 and 100 percent, which describes the system as very generous and having obvious disincentive effects. The study points out however that these types are not typical for the Hungarian population and therefore do not provide a good guide: the typical retirement age is much lower in Hungary than what is used in the standardisation. Coupled with the unreachable but existing bonus for extra work after the legal age, this leads to implausible results For variants

[2] Although this does not concern the period studied, this situation changed dramatically after 2004. In the regime in operation since then, every year of deferral earns a 6% increase in pensions, a bonus among the highest in the EU.

[3] Replacement rates are for net wages as pension is not taxable.

that are representative for Hungarian pensioners, a net replacement rate around 50 percent is more realistic, increasing only to a little more than 60 percent with above average earnings and long work history (see Table 3a in section 3 of the supplement to the cited study).

Table 5: Properties of retirements before the legal age ("transitional early retirement") without (1) and with (2) deduction

Men	1997		1998		1999		2000		2001		2002	
	1	2	1	2	1	2	1	2	1	2	1	2
Number	785	34	7,790	414	8,938	462	10,826	776	20,405	1,105	17,659	1,062
Average age	56.1	57.0	59.7	59.8	59.7	59.7	59.7	60.0	59.9	60.0	59.8	60.0
Diff. from legal age	4.9	4.0	1.4	1.3	2.3	2.2	2.3	2.0	2.1	2.0	2.2	2.0
Labour service	38.6	32.4	41.1	33.7	41.3	34.4	41.7	35.3	41.1	35.3	41.6	35.4
Deduction (percent)		5.7		3.7		7.0		5.8		5.6		5.6

Women	1997		1998		1999		2000		2001		2002	
	1	2	1	2	1	2	1	2	1	2	1	2
Number	10,788	774	12,401	818	14,994	977	21,728	2,174	6,518	546	15,922	1,255
Aveage age	55.1	55.1	55.1	55.1	55.1	55.2	55.2	55.2	55.9	56.1	56.1	56.2
Diff. from legal age	2.0	1.9	2.8	2.8	3.7	3.6	4.7	4.6	4.0	3.7	4.8	4.6
Labour service	36.3	29.5	37.1	31.3	37.2	32.3	37.4	33.4	34.3	33.0	37.8	34.3
Dedution (percent)		7.8		11.6		14.7		17.8		14.7		17.1

1: Retirement before the legal age *without* deduction

2: Retirement before the legal age *with* deduction

Tables reproduced from ONYF (2004), page 23. Rows showing average pensions and deductions in Forints are omitted.

Once claimed, old age pension can not be "handed back", the claimant will be labelled as a pensioner whatever she or he does. This fact is not very important if we look at pensions only, but has some legal consequences and possible effect on labour market chances. Pensioners are a special sort of people as far as the "act of work", the tax and the social security contribution regulations are concerned. Most importantly, people who have reached the legal age (even if they are not pensioners) can be fired immediately, without the explanation normally required in such cases. On the other hand, pension is not taxable in the period we are

looking at[4], only increases the tax base, pushing income into higher brackets. Naturally, pensioners are not eligible for unemployment benefit.

OLD-AGE TYPE PENSIONS

Regular old-age pension does not provide retirement opportunity before the age of 60 for men, and 55 for women.[5] In the case of the unemployed within 3 years of the legal retirement age, the institution of pre-retirement was available before 1998. It could be claimed by those having been unemployed for 180 days and having "no prospects to find a job" (a rather soft criterion). In case of eligibility, pension is calculated the same way as regular old-age pension. Gainful activity yielding an income more than 50 percent of the minimum wage is not allowed. Pre-retirement was re-labelled to unemployment benefit before retirement in 1998, and recently again, with the actual rules being essentially intact.

DISABILITY PENSION

Old-age and old-age type pensions always have an age requirement, and are therefore available from the age of 52 (women) or 57 (men). In the introduction we have seen that activity of the elderly starts do decrease much earlier than that, around the age of 45. A large proportion of those parting from the labour market receive disability benefit thereafter. Table 4 has shown that the number of old-age retirements are well below 50 thousand in a given year. Given the fact that a 60 year old cohort has around 100 thousand individuals, retirement through channels different from old-age retirement are clearly very important. Although the link is not rock solid, Lelkes and Scharle (2004) provide indirect evidence that disability pension can actually function as an exit route from the labour market. According to their results, if disabled people received pension benefits, they are much less likely to seek employment, even if we compare individuals with the same health status. We do not know the extent to which it is actually used so, but with around 55 thousand applications every year, 20 thousand of which are accepted, it is a powerful channel through which people leave the labour

[4] Even this was abolished in 2002. Since then, pension income is completely tax exempt, as if it did not exist at all.

[5] There are, of course, exceptions. One important one is the case of dangerous or health deteriorating occupations, where employees accumulate eligibility for even earlier retirement through service. Table 2 mentions these cases under the label "pure pre-retirement", which has actually nothing to do with the transitional pre-retirement explained in this paragraph. It is also clear that its role is limited with a share around 0.1-1 percent of all retirements. Another exception concerns miners, artist and some other special occupations through various regulations spawned by the industrial restructuring of the early 1990s.

market. The people affected are not as numerous as those transferring to old-age pension, but they are younger, so taking into account their impact on the labour market, this smaller number can be actually more important.

Disability pension can be claimed by any individual losing at least 67 percent of her/his "work capacity" and whose condition is not expected to improve within a year. Before 1998, eligibility was checked at application and lasted for a lifetime. In 1997-1998, an attempt was made to reform the system, because many health conditions leading to eligibility can be actually cured now and because a suspicion of misuse. Formerly permanent eligibility was abolished and health status of the recipients is set to be reviewed periodically and the earnings limit was strengthened somewhat. Gainful activity is permitted until the earnings from work reach the level before the health condition appeared.

The disability pension is calculated in relation to recent earnings and work experience. A person with at least 25 year work experience receives disability pension at the same level as if it was set as a regular old-age pension. This means that if a person with secondary education successfully applies for disability pension, she or he can obtain a fixed income at the level of the old-age pension at the age of 43 (if worked continuously from the age of 18 on). Those having lost their work capacity fully receive more than the respective old-age pension. Those getting old enough to become eligible for regular old-age pension keep their pension level, but are transferred to old-age pension, which means mainly that the restrictions concerning work are lifted.

UNEMPLOYMENT BENEFITS: A COMPETING SYSTEM?

It is worth mentioning that along with a quite accessible pension system, regulation of unemployment benefits is not very easy and became even tougher over time. Unemployment Insurance (UI) was available for a maximum of 360 days until 1999, 270 day thereafter. UI is liable to tax and social security contribution payment. Work is permitted only up to yielding 50 percent of the minimum wage until 1999, but none thereafter (short-term work is permitted). Gross replacement rate was 70 percent until 1997, 65 percent thereafter but is constrained to the range between the minimum wage (minimum old-age pension from 1997) and twice of that. Nagy (2000) points out that unemployment benefit claimants usually earn below-average wages. Because the unemployment benefit system imposes a minimum and maximum on benefits, actual replacement rates can be quite high compared to the theoretical one, computed on the bases on average wages and benefits. According to the calculations of Nagy (2000), actual replacement rates fell from 72 percent to around 50 from 1992 to 1998.

MODELLING MOTIVATIONS FOR RETIREMENT

Evidence presented so far shows that the disability and old age pension system provides an attractive exit route from the labour market, especially for those with bad labour market prospects: most people seem to exercise this option as soon as it becomes available. One reason for this is insufficient demand for elderly and (which is in many cases synonymous) for relatively unskilled labour, a result of a special mixture of transformation and skill biased technological change (discussed in Kertesi and Köllő, 2001 and elaborated for really low-skilled individuals in Köllő, 2006) and uncompensated income losses in the household budget during retirement (Cseres-Gergely, 2005). Nobody actually knows however, whether under stricter regulation, more or less elderly people would chose to retire later and how would they fare on the labour market. In the followings, I shall concentrate on the potential financial incentives embedded in the pension system.

The observed behaviour of the retirees is consistent with various scenarios. Claiming old-age pension past legal age does not seem to be puzzling, as there is almost no drawback from doing so. Pensioners' labour market conditions are in some senses worse, in some other sense better than others'. Those who claim pension and stop working too ("truly" retire) might do so just because they enjoy their free time under worse, but not much worse than before financial conditions. It can also be the case that they would actually like to work, but are forced into pension because of the consequences of their age. Although the motivations can be different, retirement after the legal age seem to be a "no brainer" for most, including the option I termed "transitional early retirement".

Claiming pension before the legal age however has drawbacks. As we have already seen, there is a penalty on early retirement that precludes this age and claiming disability benefit is not without difficulties either. Those choosing this option must have a serious reason for doing so: Table 5. has shown that those retiring with deduction with old-age pension lose 10 to 17 percent of their pension. Beside a similar deduction structure, claiming disability pension has its own costs, especially for those who do not truly qualify. The genuinely disabled have of course a substantial reason. Based on the evidence of Lelkes and Scharle (2004) however, it is understood that beside its health-related mission, disability pension probably acts also as a labour-market refuge.

We might suspect therefore that the reasons for really early retirement include fear from the deterioration of labour market prospects. These can act through two channels. Firstly there is a potential loss of income that might provide even less funds than pension with early-retirement conditions. Conditional on the size of the loss and discounting of the individual, this might be a substantial loss alone. Secondly, lesser wages imply lesser pensions too.

Someone with relatively good present wages but bad prospects have a very good reason to incur costs in order to obtain pension.

A THEORETICAL FRAMEWORK

To study the pre-retirement decision, I shall use the general framework of the option-value model of Stock and Wise (1988), a standard workhorse of retirement-research. Given the transition setting, this model can be thought of one of the decisions the individual is facing in the Boeri (2001) model. Before laying out the operational model, let us look at the original one briefly! The model is one of intertemporal choice: an agent has to choose between two mutually exclusive states. In state *W*, income is risky and it comes from employment, while in state *R*, income is fixed and it comes from retirement benefit. The agent lives until time *T* and has to decide upon when to move from *W* to *R*. This decision can be translated to a series of possible decisions in every time period *t* to retire or not. Earlier retirement means that the secure, but potentially lower income stream starts earlier, forgoing accrual if available when retiring later. The fact that *R* is an absorbing state and no work is possible in *R* is a key to the analysis. This assumption does not only make the theoretical model tractable, but is also empirically relevant. Because of this, the option to switch in the *r*th period has the value $V_t(r)$ in the *t*th period is given by

$$V_t(r) = \sum_{s=t}^{r-1} \beta^{s-t} U_W\left(Y_s\right) + \sum_{t=r}^{S} \beta^{s-t} U_r\left(P_s(i)\right),$$

where β is a discount factor describing time preference and is constant for everyone, *i* is the interest rate, U_w is the per period utility function applicable during work, U_r is the per period utility function applicable in pensioner status, Y_s is the income offered by work, P_s is the income offered by pension. V is the lifetime utility function. In every period, a decision has to be made whether it is worth retiring in *t*, or postponing it to the later time of *r*. For this, the expected realisable positive gain to be examined for every *r*, can be simply formulated as

$$G(r)=\mathrm{E}_t[V_t(r)] - E_t[V_t(t)].$$

The decision is based on whether *G(r)* is the greatest in the current period *t.*, among all possible periods. If it is, retirement is optimal in *t*. The empirical strategy is to specify a discrete choice model including the variable characterising the expected income flows. According to the authors, who examined the impact of the structure of US occupational pensions on retirement, both salaries and pensions have a strong, but different, correlation to age.

The option-value model has been developed and first used to explain the incentive effects of firm-level pension schemes. It was however subsequently applied to other environments, such as social security pension schemes in Europe. In the case of Germany, Börsch-Schupan

et al (2001) uses the option-value framework to look at the incentive effects of early retirement programmes. The simple specification used by Stock and Wise (1988) is refined here and expected wage growth is estimated on the basis of past individual wage growth.

AN OPERATIONAL MODEL AND ESTIMATION METHOD

In what follows, I apply the idea of the option-value model to Hungarian data to show the incentive effects embedded in the pension system in general. Because retirement at legal ages or beyond hardly needs any explanation of the kind considered here, I focus on retirements that occur before this time, ie. early- and disability retirement.

The data required for estimation of the option-value model or any complete model of the retirement decision is unfortunately not available in Hungary. Administrative records of course hold the necessary information for computing pension when individuals have actually applied for it. However, these are not accessible for research at the moment and can not be linked to contextual information either. As there is no specialised survey running that would cover the elderly (such as SHARE in the EU or the HRS in the US), one can only resort to general purpose ones. The survey I rely on will be described in the next section, but we have to note in advance that it provides information on one individual for only two time periods, which is not enough to exactly calculate either social security wealth, or expected pension. This means that the option-value model is inapplicable in its original form – a modified version is needed, where both expected working and pensioner income are calculated as a function of observed characteristics.

In the modified model, agents face the same decision problem as before – choosing between the mutually exclusive Retired and Nonretired (Working) states –, but now the decision is based on the next period expected income. Let us denote the income of individual i in state 1 as y_{1i}, the observable variables driving variation in y_{1i} as X_{1i}, and the unobservables as u_{1i}. The same specification is applicable to state 2, with appropriate rewriting of the indices. Note that the relevant labour income to compare to pension income here is the one expected to commence in the next period. Because the data at hand covers only two period per person without any retrospective wage data available (see next section), only current period income and individual characteristics can be used to predict next period income both in the non-pensioner and pensioner state.

Our interest focuses on the equation deciding upon retirement. From another point of view, this decides upon which equation will describe the income flow of the individual in the future. This is captured by a simple binary index model, in which the decision is driven by observables we denote with Z_i and an unobservable factor denoted by u_i. These observables

include income in the two states, y_{i1} and y_{i2}, along with other factors driving the decision, such as the value of non-work time, employment opportunities and the like.

Note that this is a switching regression model, similar to the union- non-union wage model of Lee (1978) or Maddala (1983). The fact that X_{1i} and X_{2i} are not the same does not change much and can be thought of as an a priori restriction. The model can be summarized formally as follows:

$$y_{1i} = X_{1i}\beta_1 + u_{1i}$$

$$y_{2i} = X_{2i}\beta_2 + u_{2i}$$

$$I_i = \begin{cases} 0 & \text{if} \quad Z_i\gamma \geq u_i \\ 1 & \text{if} \quad Z_i\gamma < u_i \end{cases}$$

(Z_i includes y_{0i} and y_{1i})

$$u_1, u_2, u_3 \mid X_1, X_2, Z \sim N_3(0, \Sigma)$$

$$\Sigma = \begin{bmatrix} \sigma_1^2 & & \\ \bullet & \sigma_2^2 & \\ \sigma_{1u} & \sigma_{2u} & 1 \end{bmatrix}$$

The unobservable factors are assumed to be joint normal. Observe that in their variance-covariance matrix Σ, one entry is missing and can not be calculated. This is because the two states are mutually exclusive, so we can actually observe individuals only in one of them. Because we suppose that people actually chose to be in one or the other state (ie it is not only fate or labour market pressure that makes them pensioners), it might well be the case that the two groups are systematically different in characteristics that determine their income in one or the other state. This can include genuinely unobservable components, or information that is missing only for us, observers. A classic example for the first is ability in the equation for expected future labour income, which can make wages higher for some people given the same observed characteristics. In the case of the pension equation, poor or good work history despite a good/poor wage observed in period 1 is a prime suspect for driving pensions up/down conditional on observables.

Calculating pensions this way is completely non-standard, but in the case of working income, it is comparable to what has been done before. The wage model is first-order autoregressive with individual characteristics – similarly to the model of Stock and Wise (1998). The important difference comes through the fact that estimation is based on current and future, not current and past earnings. This decision is necessary because of the inability to calculate the expected value of the pension benefit, but makes it necessary to handle selectivity

in the retirement process. Indeed, if important unobserved characteristics are at work in sorting people between states and they are also correlated with observables, ie. σ_{1u} and σ_{2u} are not zero, estimating the equations by OLS gives inconsistent estimates. Note that if wages were calculated on the basis of retrospective data and in a way that individual characteristics in wage growth are taken into account, this correction is not so crucial. Also note that the calculation proposed here excludes everybody from the working sample who did not have income from wages or sick pay.

One way out of the problem is to estimate the resulting system jointly with maximum likelihood, explicitly allowing for a correlation between unobservables: supposition of normality allows us to do that. Full information maximum likelihood estimation has however the same numerical stability problems we encounter in the classic case pioneered by Heckman (1978) and more, given the slightly more complicated nature of the problem.

To simplify estimation, we can exploit the fact that the two states we consider are mutually exclusive and σ_{12} is nonexistent. Because of this, the problem reduces to the estimation of two equations with selectivity, sharing the same selectivity equation. Note that because the reduced form probits correcting for selectivity are specified the same way, the actual estimates will be numerically identical, except for a negative sign prepending one set of results. As a first step, the equations in turn can be estimated as two-step Heckman models for improved stability. As a second step, expected incomes are predicted from these equations and at the third step, then entered into the selection probit to estimate its structural form.

Before proceeding further, two remarks are in order. First apart from the necessity, dictated by the data at hand, it is useful to examine the identifying assumptions underlying the three approaches seen so far. Stock and Wise (1989) uses a single wage equation to predict future potential wages for all individuals in the sample, based on cross-sectional data, essentially disregarding the importance of selection. Börsch-Schupan et al (2001) employs a more sophisticated approach as they calculate individual-specific wage growth predictions based on a long string of past wage evolution. If wages are evolving over an individual-specific profile and this is the strongest determinant of expected wages, this method gives very good results.

The method outlined here concentrates on expected, but perhaps not observable forces that shape wages. Using current wages to predict future ones is formally equivalent to predict current wages by past ones, but the fact that the outcome wage is *ahead* of the decision, make a theoretical and difference – and perhaps a practical one too, but given the data, this can not be tested. Beside using actual future realisation, selection is taken into account, which, depending on the source of differences between individuals, might capture individual differ-

ences better or worse than individual-specific wage growth equations. If growth is first order, and the selection correction is acceptable the method proposed here is superior.

Secondly one has to note that the proposed equations do not conform to the standard form of a selection model. Indeed, the main regressor used is wage in time *t*, while the outcome is wage in time *t+1*. If not only wages, but the shock is also autoregressive, lagged wage is endogeneous in the wage equation. As there are only two periods of data available, this can not be detected or corrected and the parameter on lagged wage can be upward biased.

DATA

This study relies greatly on the Rotating Panel of the Institute of Economics, Hungarian Academy of Sciences, based on the Hungarian Household Budget Survey (HHBS) of the Hungarian Central Statistics Office. The survey has been running since 1993 in a relatively constant fashion. The primary sampling unit is the flat, and every person in the flat is surveyed. There is variation over time in the sample size: a cross section consists of 8 to 10 thousand households, which translates to 22-26 thousand individuals. There is detailed information about the demographic and key labour market characteristics of the entire household, and the incomes of the various individuals, including the income/consumption arising from own production.

The HHBS is principally a cross-section, but in order to keep the sample "fresh", the HCSO implements a rotating design through 3 years. Although the HCSO usually does not assemble the panel elements into a real panel dataset, there is enough information to do so. György Molnár, senior research fellow of the Institute of Economics, Hungarian Academy of Sciences has pioneered the HHBS panel, dubbing it the Rotation Panel (RP, documented in Kapitány-Molnár, 2001). The specific rotating structure means that if a household enters the sample in wave 1, remains there until wave 3, and leaves it thereafter. In practice, this means that in the periods of 1993–1995, 1996–1998 and 1999–2001 the data of the various households and, unless the composition of the households has changed, also of their members can be connected into three separate but identically structured panel databases.

This type of linkage is unfortunately hampered by heavy attrition in the last year, which results in very few observed transitions into pensioner status. Linking only two years thus gives disproportionately more observations, hence transitions. The resulting short panels are every combinations of adjacent years from 1993 to 2001, except for the 1995-1996 one. There is a price to be paid for this treatment however. Because the HHBS does not record income spells just monthly or yearly totals, there is no way to find out from yearly data, whether a person retiring has low labour income because he or she was working only a few months, or

because the wage was low.[6] As monthly data is affected less by this kind of problem, it is that what is used in the analysis. Even though it is probably more contaminated by transitional income shocks, these are most certainly smaller than the distortion brought about by the inability to account for the length of income spells within a year. An initial version of this paper used 3 year panels and yearly data to estimate the models. It turned to be unfit for that purpose, but exactly because of the noise inherent to monthly data, the Tables 6-8 of income and expenditure changes still use the 3 year panel.

Because the number of transitions is not too large even in the seven 2 wave panels, I have analysed them together ("stacked"), rather than separately. This may be regarded as an extension of the pooled cross-section analysis method. However, as in the case of the pooled cross-sections in general, it is necessary to address the effect of the 'forgotten' historical time. I do this by inflating the cash variables to a common point in time (2002) and, for regression analyses, by including the various control variables and indicators to control for the passage of historical time.

The resulting database consists of a total of 79,156 observations, including children and elderly. Looking at only the population between 45 and 65 years of age leaves us with 34,509 observations, which shrinks to 6,184 as soon as we keep only those having a spouse with complete set of information and with a positive net income, not being pensioners and unemployment benefit recipients. The two latter restrictions are crucial, as it is only earnings data that can be used to the estimate expected pensioner and non-pensioner income. Out of the 6,184 persons in the risk group, we observe 502 transitions to pensioner status. Due to the uneven pattern of missing data, it is 5,264 observations with 383 transitions that we can analyse in the econometric model.

As we have seen earlier in the discussion of the pension system and administrative data, it is the "really" early retirees, who sacrifice a substantial amount of income by not working, which suggests that we have to pay particular attention to them. Out of the 383 transitions there are only 15, which took place after the legal retirement age. Drawing the divider line 1 year before the legal retirement age yields 258 "before" and 125 "after" transitions.

Ideally, we would also like to differentiate disability and old-age pensioners – we have already seen that the two retirement routes have potentially different characteristics. This is however not possible after 1997, and even if it was, the resulting sample size would be very

[6] After 1998, there is in fact information on the total length of the period(s) when a given income type was received. But even here, we do not know how many spells were involved, only the sum of earnings and the total length of all periods.

small in either case. Because of this, I do not differentiate pensioner types and define a pensioner based on the criterion "receiving pension income in a given period".

ESTIMATION RESULTS

To estimate the model laid out in Section 4, we have to estimate the equation of next period retirement and working income, then use the predictions in the selection probit model. Income at work is parameterised as a standard Mincerian wage equation with wage dynamics that accounts for potential wage rigidities. Along with previous period income, experience and schooling is included, plus local activity rate (effect of local labour markets) and dummies for females and different panel periods. Lambda is the inverse mills ratio controlling for selectivity.

Table 9: Selectivity-corrected estimates of expected working income (Heckman two-step estimates with selection probit)

Outcome: Working income in t= 2 (net, log)			
	parameter	std.error	
Income in t=1 (net, log)	0,665	0,012	**
Potential experience	0,020	0,014	
Potential experience squared	-0,000	0,000	*
Schooling: vocational	-0.013	0.039	
Schooling: secondary	0.077	0.041	*
Schooling: college	0,165	0,142	**
Female	-0,083	0,011	**
Local activity rate	0,204	0,093	*
Lambda	*0,118*	*0,048*	**
Constant	3.30	0.262	**
+panel and regional dummies			
Corr(y,yhat)	0,76		
N	5.262		
Censored:	383		

The reduced form probit: Outcome: NOT claiming pension in t=2			
	Parameter	std.error	
Income from own production (%)	-0,055	0,316	
Partner retired	-0,159	0,067	**
Took sick leave	-0,446	0,070	**
Age	-0.130	0.026	***
Female	0.131	1.429	
Potential experience	0.240	0.087	**
Potential experience squared	-0.003	0.001	**
Income in t=1 (net, log)	0.313	0.101	***
Local activity rate	0,404	0,614	
Constant	4.465		
+schooling, employment type, employment status, occupation, industry, regional, settlement type and panel dummies			

Because lagged income is included in the equation, effects of conditioning variables can be interpreted as governing (about half of the) growth of wages. Although potential experience has no significant effect, increasing education exhibits the well known positive effect on wages. Ideally the equation should be estimated for men and women separately, as women are known not only to earn lower wages than men, but with different impact of the relevant drivers. The small number of observations does not permit this, but the negative parameter on the dummy for women captures the expected effect well. The positive impact of the local activity rate represents the effect of a wage curve: local labour markets with higher activity rate (lower inactivity rates, thus lower market pressure) yield higher wages. Some of the regional and time dummies are significant too, introducing a downward correction for worst performing regions and years immediately after the transition. Fit of the labour income equation is good, producing a 76 percent correlation between observed and predicted income for the population that is working through period 2.

Lambda, the control variable in the labour income equation has a statistically significant positive sign, indicating that the persons remaining in employment from period 1 to period 2 are indeed a selected population. The sign of the parameter indicates that the implied correlation between the unobservables in the labour income and the selection equation is positive. If we think of this unobservable variable as “ability” affecting labour market success, this means that more able people earn *more* and also consider retirement *less* than the less able ones, fixing everything else. If this is indeed an omitted variable correlated with (good) labour market experience, we can conclude that it affects both wages and the probability of not retiring. This is the result we expect based on the simple model.

Turning to the reduced form selection equation, we see that it gives results that are by and large in line with our expectations. The presence of a retired spouse (an important determinants of the value of non-work time, see Coile, 2003), taking sick leave in period 1 (a proxy for health problems) and age decreases the likelihood of continued work. Local activity rate and the share of own-production compared to total expenditure however exhibit no significant effect. This is a somewhat surprising, but quire robust result. Results do not suggest regional differences in propensity of a continued career. In years of the first increase in legal retirement age we observe an increased propensity to retire later.

Table 10: Selectivity-corrected estimates of expected pensioner income (Heckman two-step estimates with selection probit)

Outcome: pensioner income in t=2 (net, log)	parameter	std.error	
Income in t=1 (net, log)	0,359	0,055	**
(Income in t=1) * (female)	-0,009	0,055	+
Potential experience	-0.005	0.010	
Lambda	0.023	0.094	
Constant	6.961	0.922	**
+ employment type, employment status, occupation, industry, panel dummies			
Corr(y,yhat)	0,77		
N	5262		
censored	4879		

Note: results for the selection equation are identical to those presented in Table 9, but with a negative sign.

The next equation predicts pensioner income as a function of the log of period 1 net income and other variables affecting pension. Because the pension formula includes last period income in both the pre- and post-1997 regime, this variable is highly relevant and stand for earlier wage experience too. It has indeed a statistically significant effect on pensioner income. Past labour market experience is proxied by the interaction of last (period 1) net earnings and a female dummy, plus a set of job-related indicators: employment status, employment type, job type and industry of employer. The interaction is meant to capture that on average, women accumulate less labour market experience than men and therefore either retire later or – as we have seen in the administrative data – with greater deductions from their pension. Job-related indicators reflect the observation that employees in different jobs and industries had very different chances to switch to a new, more profitable job during the transformation. Although the interacted variable is significant only at 10 percent level, and only some of the job-related indicators are significant at any level, together they contribute significantly to the identification of the pension equation. Note also that this equation is essentially estimated on the 383 individuals claiming pension. Considering this and the imperfect proxies used, the explanatory power of the pension equation is quite good: the correlation between the predicted and actual pensions is 77 percent.

The selection equation was specified the same way as in the case of the labour income equation. The results are the same in absolute terms, as they should be, with the exception that lambda, the variable controlling selection is insignificant. This might be due to the fact that there is only a few observations that are informative about income in pensioner state.

Table 11: Structural probit estimate of retirement

Outcome: claiming pension in t=2			
	dP/dX	std. error.	
Predicted pensioner income (net, log)	0.025	0.013	*
Predicted working income (net, log)	-0.060	0,013	**
Income from own production (%)	0,003	0,025	
Partner retired	0,025	0,007	**
Sick days	0,049	0,009	**
Age	0.011	0.000	**
Local activity rate	-0,035	0,056	
+regional and panel dummies			
Pseudo-R2=0.11			

Table 11 presents the structural probit estimates of the marginal effects of the regressors on the probability of claiming pension. These were calculated by predicting and including both labour and pensioner income into the probit equation for retirement for both those who transferred to retirement and for those who did not.

For the variables excluded from income equations, the results are similar to what we have already seen in the reduced form probit. Concerning the expected period 2 incomes, results conform to expectations. A higher labour income decreases the propensity of retirement, while a higher expected pension, fixing labour income, increases it.

As a robustness check, the above estimates were repeated on a number of different populations and with different specifications. Instead of the 45-65 year olds, I also used the above 45, below retirement age group, those above 45, but 1 and 2 years before early retirement age, all the above with no restriction on the lower end. I also experimented with including the job-type set of indicators also in the wage equation, where some could comment, they also belong. Although the results were not identical, they were very similar and always gave the same qualitative answer, suggesting that the obtained results are quite robust.

CONCLUSIONS

Activity of the working age population is quite low in Hungary, similarly to other new EU member states, with the exception of the Czech Republic. In this paper I argued that the workings of the Hungarian pension system contributed substantially to the rise and persistence of this situation. Already raw data confirmed that the comparatively low legal retirement age creates incentives to retire in itself. Estimation of a model of retirement on individual data also helped detecting the effect of direct financial incentives for retirement through early and disability retirement schemes. Results show not only that these incentives have a significant effects on decisions but also that those choosing such forms of retirement can not be viewed as a random draw from the population, but have some unknown characteristics

that influence both the retirement decision and the evolution of wages. If one wishes to obtain credible estimates of the effects of financial incentives, this selection process has to be taken into account.

What can we make of these results now, as the economic transformation is essentially over? Shocks will hit other economies and governments will take measures to alleviate them, often in the form of public policy affecting employment. If this is so, and if the similarity is sufficient, the post-socialist experience can serve as a mighty example to these coming occasions. Firstly, we have noted that there is only partial, but quite sensible evidence indicating that a large part of the now pensioner population flowed into this status during the early 1990s. If that is so, and if the affected population would have indeed been unable to secure a job after being laid off, a pension policy that offers relatively painless exit from the labour force makes sense in many ways, and so does the selection that became apparent in the estimates obtained here.

Keeping the essentially same regulations several years after the sock appeared however makes much less sense. If dealing with the low employment rate is of importance to the government, these regulations have to be changed promptly and in a substantially. Secondly, the story has another moral, also mentioned in Köllő (2006): knowing the way many pensioners got into the position they are in, their reactivation through various programmes seems to be of little importance and quite likely: impossible.

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