Financial consequences of career breaks

A latent growth model on register data

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1. Introduction

In Belgium, the Career Break Scheme allows employees to interrupt their careers temporarily while receiving a (limited) replacement income from the government. The scheme was brought to life in 1985 as an answer to the high unemployment rate. The underlying idea was to create more space on the labor market for the unemployed. Throughout the years the scheme gradually shifted from an economic to a more individual-oriented measure by adding thematic leaves (i.e. parental leave, leave for medical support or leave for palliative care). In 2002, this policy shift was recognized and confirmed with the name change to 'Time Credit' in the private sector (Vanderweyden, 2002). The new Career Break Scheme is promoted as a way to increase the quality of life with a specific emphasis on the work-life balance or as the introduction on the brochure of Career breaks in Belgium states: "Take a career break to make time for yourself or for the ones nearby (for example to study, to raise your children, to travel, as a transition to pension,…)" (RVA, 2010).

The career break scheme enjoys a great popularity and the number of people entering the system of career breaks still increases rapidly every year in Belgium. Over the years, the number of people doubled from 111 994 in 2001 to 223 319 in 2007, up to a record of 261 059 in 2010 (RVA, 2010). The majority of people taking a career break are situated in Flanders where the government provides additional financial incentives to take a career break. Less people are taking a full-time career interruption, but more and more people find their way to the part-time break. The career break scheme is yet to discover its limit.

Little is in fact known about the consequences of the Career Break Scheme. In international research, it is generally believed that employees who interrupt their careers will be penalized on the labor market. Studies have shown the negative effects of taking a career break on career development in terms of fewer promotions and wage depreciation compared to individuals with continuous working patterns (e.g. Spivey, 2005, Theunissen, et.al., 2009). Since career interrupters might not always be aware of these negative effects before taking a career break, it is important to investigate the effects of career breaks. In this report, we will focus on the wage differentials after a career break. From the literature, it is still unclear how much wage loss can be expected. From longitudinal administrative data we derive a sample of employees living in Flanders from 1998 to 2006 to examine wage differentials after a career break. For wage comparisons a control group without a career break is employed.

In the first part, we introduce the Career Break Scheme and the different possibilities of taking a career break in Flanders in more detail (i.e. full-time career break, part-time career break and thematic leaves). The most important findings on the consequences of career breaks of previous studies are then discussed in the literature review. From this literature review, we can distill some hypotheses concerning the effects of career breaks in a longitudinal perspective. Subsequently, the data and methods used in this study are discussed. Here we will look at the data that have been sampled from the Belgian administrative database as well as the selections that were made for the analyses in more detail. Then, the method – multilevel growth modeling – is introduced. After this, the results from the multilevel growth modeling will be presented.

2. Literature review

2.1 The Career Break Scheme in Flanders

In Belgium, employees are entitled to interrupt their careers temporarily by means of the Career Break Scheme. During this career break, employees are given a limited replacement income. The Flemish government stimulates the use of career breaks further by giving additional financial incentives under certain conditions on top of the federal replacement income. The majority (65%) of the people in the career break system in Belgium are situated in Flanders (RVA, 2010). There are several options persons can use to take a career interruption. There are full-time breaks, part-time breaks, and specific thematic leaves. These three types are discussed in more detail in the next paragraphs. This will be done by taking age (Table 1) into consideration as well as the evolution in usage of each type (Figure 1).

2.1.1 Types of career breaks

Full-time career breaks

The full-time career break allows employees to interrupt their careers and stop the work activities completely for a limited period of time for whatever reason. A career break is called 'Time Credit' in the private sector. The distinction, and coinciding name change, between sectors was introduced in 2002 when the system of career breaks was reformed. Except for the name and the extended duration in the public sector (6 years instead of 5 years), both systems are similar. In the following graphs this reform is clearly indicated since career breaks were not divided between public and private sector before 2002.

Figure 1 gives an overview of the evolution of the different career break types of the past ten years. In 2000 less than 20 000 persons took a full-time career break. After the reform the number of full-time breaks stayed rather low in each sector and even diminished slightly over the years. There is an apparent decline in the options to take a full-time career break due to the increasing popularity of the part-time career break options and thematic leaves. The majority of the people (76%) taking a full-time career break, either in the public or in the private sector, are between 25 and 49 years old (Table 1).

Part-time career breaks

It is also possible to reduce the number of working hours temporarily. Among the part-time breaks, it is possible to choose how much they want to reduce their work: 50%, 33%, 25% or 20% (RVA, 2010). We will not make a distinction between these categories but they are all included in the part-time breaks. Again, there is a conceptual difference between public (Career Break) and private sector ("Time Credit"). Reducing the amount of working hours is by far the most popular option across all career break types. The popularity of the part-time scheme in the private sector has grown spectacularly since its introduction in 2002. In the public sector there has been, however, a decrease in part-time breaks since the reform in 2002. The initial draw-back can be due to the fading out of this type of career break as it slowly disappeared for employees from the private sector. The (further) decline can also be caused by the fact that more and more people turn to thematic leaves. The past three years the number of people taking a part-time break in the public sector has remained quite constant.

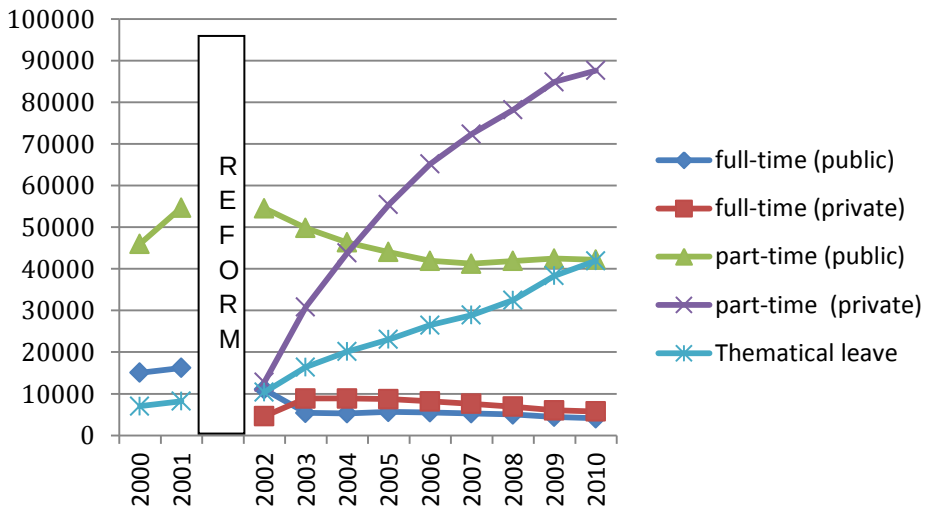
The part-time career break is especially interesting for persons of 50 years or older. They are given the opportunity to work part-time until their retirement. This is probably why we can see that this type of career break is also very successful among the older employees. Almost 66%

of the people who took a part-time break in 2010, either in the public or private sector, are 50 years or older (Table 1).

Thematic leaves

In addition, there are specific career breaks that are tied to particular reasons: thematic leaves. There is no distinction between the private and the public sector. Among the thematic leaves there are three important types of leaves: i) parental leave, ii) leave for medical assistance or iii) leave for palliative care. From these three possibilities parental leave is by far the most popular (85%); leave for medical assistance accounts for less than 15% and finally leave for palliative care is limited to less than 1% (Geurts & Van Woensel, 2005). From Figure 1 we can see that there has been a steady rise in the number of persons taking thematic leaves over the years. Most of the people taking these specific leaves are situated in the middle age category (25-49 years) (Table 1).

Figure 1: Number of persons in each type of career break in Flanders



Source: RVA: interactive statistics

2.1.2 Evolution and profile of the different types of career breaks

The career break scheme has become increasingly popular. The evolution of the past ten years, shown in Figure 1, gives more insight into the usage throughout the years. Because each type of career break is represented, a more complete view of the evolution arises. The popularity appears to be double. On the one hand, there is a decrease in the number of full-time career breaks, while there is an enormous increase in the number of part-time career breaks. It is primarily the rise in part-time breaks that explains the growth of career breaks over the past ten years.

Table 1: Number of persons in each type of career break per age category in Flanders in 2010

	Part-time [a]	**%**	**Full-time** [a]	**%**	**Thematic leave**	**%**
< 25j	196	*0,15*	223	*2,26*	905	*2,16*
25-49j	44 121	*34,00*	7 449	*75,50*	37 740	*89,99*
>= 50j	85 467	*65,85*	2 194	*22,24*	3 295	*7,86*
Total	129 784	*100,00*	9 866	*100,00*	4 1940	*100,00*

Source: RVA: interactive statistics, situation in 1st January 2010

[a] This is a sum of the public and private sector

The majority of people taking a career break choose to do this on a part-time basis. In 2010, almost 130 000 people took a part-time career break, either in the private or in the public sector. Since the numbers are similar for each sector, we only present the combined numbers in Table **1**. Little more than 85 400 of these people were aged 50 years or older. This stands in great contrast to the full-time options where less than 10 000 people took a full-time career break in 2010. The thematic leaves are also rather high, with almost 42 000 people taking a leave for a specific reason. Almost all of them belong to the middle age category.

There are important differences between men and women in the use of career breaks. Taking a career break is still more common among women compared to men. In Table 2 we can see that 66% of the people taking a career break are female. This hegemony of women becomes even more apparent among the full-time breaks and thematic leaves (respectively 77% and 72%). This percentage is, however, lower among the part-time breaks (63%), where the part-time options are gradually finding their way to men.

Table 2: Number of men and women in each type of career break in 2010 in Flanders

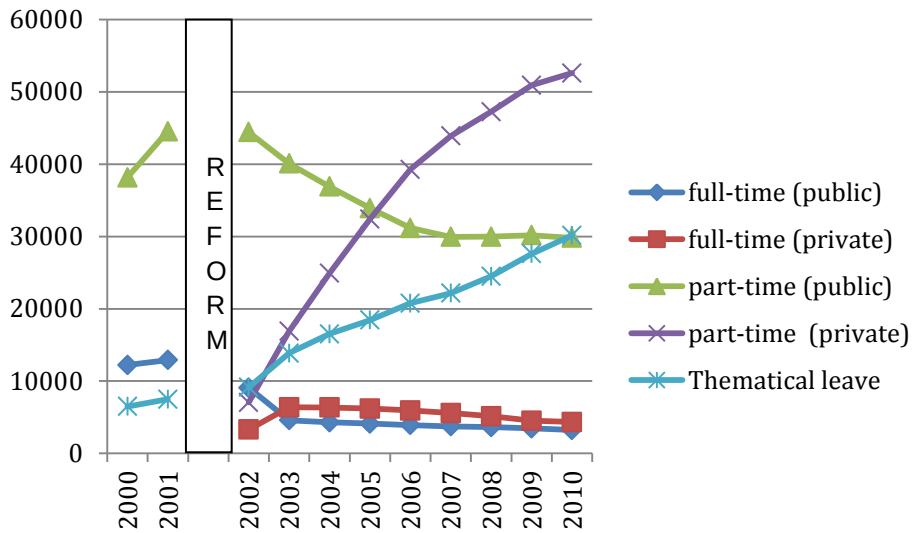
	Part-time [a]	*%*	Full-time [a]	*%*	Thematic	*%*	Total	*%*
Men	47 400	*36,52*	2 294	*23,25*	11 788	*28,11*	61 482	*33,86*
Women	82 384	*63,48*	7 572	*76,75*	30 152	*71,89*	120 108	*66,14*
Total	129 784	*100,00*	9 866	*100,00*	41 940	*100,00*	181 590	*100,00*

Source: RVA: interactive statistics, situation in 1st January 2010

[a] This is a sum of the public and private sector

Due to the fact that primarily women take career breaks, we can see that the evolution in popularity (see Figure 2) is quite similar to the general evolution discussed in the previous section (Figure 1). Throughout the years, there has been a small decrease in full-time career breaks, while part-time breaks have become more important. The part-time break increased very fast every year in the private sector. This part-time break has become the most successful option to break compared to the other options. In the public sector, however, there has been a decline in part-time as mentioned earlier.

Figure 2: Evolution of number of women in Career Break Scheme in Flanders from 2000-2010

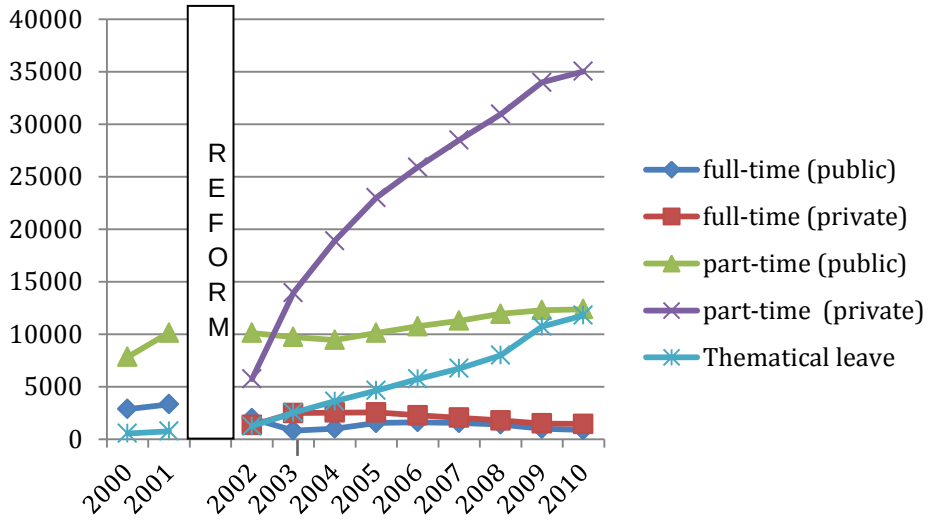


Source: RVA, 2010

Over the years, the number of male interrupters went up considerably. This increase seems to be primarily due to the raise in part-time breaks among men (Figure 3). Among the part-time breaks, it is clear that men are mostly 50 years or older (Table 3). This shows that the expansion is mainly situated among the older men in light of their retirement. The full-time interruptions remain at a rather constrained level, while the number of men taking a thematic leave also increases notably. This could be a sign that it is slowly becoming more acceptable for men to take a break for family reasons.

Thematic leaves are generally used between the ages of 25 and 49 years. Most women who take a full-time career break are situated in the middle age category. This is the same with men, albeit a full-time career break is rather marginal among them. The youngest age categories are underrepresented in each type both for men and women. This is not surprising because there are certain requirements in order to take a career break, e.g. a work experience of 5 years in the same job. A part-time break seems very popular among the oldest age category for men as well as for women (Table 3). This reinforces the image of taking a career break as an exit strategy to retirement. This is more apparent for men where most part-time interrupters (86%) are 50 years or older. Among women, there is also a significant number that takes a part-time break in the middle age category.

Figure 3: Evolution of number of men in Career Break Scheme in Flanders from 2000-2010



Source: RVA, 2010

The distinct profile of persons taking a career break in Belgium is confirmed in the literature (Steegmans & Valgaeren, 2001). Women generally interrupt their careers between ages 25 and 35, indicating that they are mostly motivated by familial reasons. Men on the other hand are usually 50 years or older, they generally use a break as an end of career measure. In light of these differences, it can be expected that there are different motivations between men and women to take a career break. According to a study of Desmet, Glorieux and Vandeweyer (2007) the main motivation to take a break is because of children both for women and for men under the age of 50. Part of the men with a full-time break nevertheless use it to try out another job or begin an own business (Devisscher, 2006).

Table 3: Number of men and women in each type of career break by age (Flanders)

MEN						
	Part-time [a]	**%**	**Full-time [a]**	**%**	**Thematic**	**%**
< 25j	22	*0,05*	77	*3,36*	72	*0,61*
25-49j	6 579	*13,88*	1 440	*62,77*	10 338	*87,70*
>= 50j	40 799	*86,07*	777	*33,87*	1 378	*11,69*
Total	47 400	*100,00*	2 294	*100,00*	11 788	*100,00*
WOMEN						
	Part-time [a]	**%**	**Full-time [a]**	**%**	**Thematic**	**%**
< 25j	174	*0,21*	146	*1,93*	833	*2,76*
25-49j	37 542	*45,57*	6 009	*79,36*	27 402	*90,88*
>= 50j	44 668	*54,22*	1 417	*18,71*	1 917	*6,36*
Total	82 384	*100,00*	7 572	*100,00*	30 152	*100,00*

Source: RVA: interactive statistics, situation in 1st January 2010

[a] This is a sum of the public and private sector

There has been an increasing popularity of career breaks suggesting that these flexible policy measures seem to address a certain need to interrupt careers temporarily. Moreover, it appears that taking a (part-time) break is becoming more acceptable and popular among men and women. The profile of career interrupters is nevertheless different from the 'average' Belgian employee, indicating not every employee had the same chance of taking a career break. Higher income groups for example would be more able and thus more likely to take a career break (Devisscher, 2006). This suggests a potential selection of people that are more inclined to take a career break. The possibility of self-selection needs to be taken into consideration in the analyses when examining wage differentials after a career break.

2.2 Theoretic models explaining consequences of leave schemes

The work-life balance is a priority in a series of initiatives of the EU policy, concerning childcare, work time and flexible arrangements that can have a direct effect on labor participation, family and life quality (Eurofound, 2004). Flexible arrangements like the Career Break Scheme are considered useful instruments to achieve a better work-life balance (Hyman, 2004). There are, however, indications from previous research that there are possible unwanted negative consequences on subsequent wages due to career breaks (e.g. Arun & Arun, 2004)[1]. In this section we will summarize the most important findings of the past research concerning career breaks.

Most international research points to income losses as a consequence of a career break. Immediately after the career interruption, the wages would be relatively lower than before (Mincer & Ofek, 1982). The effect of career breaks also seems to be dependent on the timing and the length of the break. Corcoran (1977) found that there was only a negative effect on wages when it was used in the beginning of the career. He also found evidence of a recovery of the income losses after the break as wages increased more rapidly (Corcoran, 1983). In addition, studies found that the longer the interruptions were, the lower the wages would be after the break. Short interruptions had a rather small or no impact on further career development compared to longer interruptions (Mincer & Ofek, 1982; Forrier & Sels, 2006).

The significant wage losses have often been explained by the fact that a work interruption is associated with a loss of human capital (*Human Capital Theory* of Becker, 1985). According to this theory, wages and job opportunity reflect the productivity of individuals. This productivity increases as education, training and job experience increase (Becker, 1964). Therefore, it can be assumed that a career break interrupts the accumulation of work experience and can even cause the human capital to deteriorate during the break. As a consequence, it can lead to a lower productivity and reduce job opportunities. This can explain the relative lower wages career interrupters are confronted with after a break. The recovery period after the break, would be a phase where previously eroded human capital is restored (i.e. a catch up effect). Given such a process would be quicker and less costly than building up new human capital, this process and the wage growth will eventually slow down and continue to grow at the rate of the worker without a career break (Mincer & Ofek, 1982).

In some studies, however, the loss of human capital could not explain all of the wage differentials. The wage losses as a consequence of career breaks were found to exceed losses due to foregone work experience (i.e. an indicator of human capital) (Beblo & Wolf, 2002). Moreover there were studies that found gender differences in the effects of career breaks on income that suggest other factors are playing an important role, because the loss in human

[1] An overview of the literature on wage effects after a career break can be found in a report of Frans et al. (2008).

capital would be equal among men and women (e.g. Albrecht, 1999; Booghmans, 2006). These studies refer to the *Signalization Theory* to explain these gender differences.

A temporary career break can send a message (signal) to employers that these persons would be less committed to their job and prioritize their family over their work. This signal can play an important role in decisions regarding promotions where higher commitment is expected (Forrier & Sels, 2006). People who interrupt their career are in fact stigmatized for doing so (Beblo & Wolf, 2002). Men with a career break would be less committed to their jobs. Employers would respond to this correlation by means of lower wages. On the other hand, women are traditionally the ones to take a break for family reasons. Being a common strategy for women, they are expected to send a different signal to their employers which would lead to less wage loss compared to men. The smaller wage loss found among women could then be due to the loss in human capital, while the additional wage loss for men could be due to stigmatization (Albrecht, 1999).

The *Statistical Discrimination Theory* (Arrow, 1973 in: Román & Schippers, 2005) states that career breaks can encourage employers to discriminate certain groups. The employer would make a trade off based on previous experiences with former members of a certain group. Often a feature of an individual is ascribed to the whole group. Because mostly women take a career break, this is anticipated and taken into account for women in general. They are viewed as less productive on the long term causing them to have lower wages and job opportunities compared to men where a break is not expected. The eventual wage losses after a career break can therefore be less negative for women than for men because this was already reflected in their wages (Schneer & Reitman, 1990).

Contrary to the other studies on career breaks, there is one Belgian study that finds evidences of positive effects of career interruption on consequent wages (Román et al., 2006). Based on data from the PSBH and Datawarehouse part-time as well as full-time breaks had a positive effect on wage. They explain these contradictive results as a signal from employees to their employers that they are ready to start again. Moreover they are less likely to take another career break compared to persons that have not (yet) taken a break. This corresponds with the theory of *New Home Economics* (Becker, 1985; 1991). This theory also places productivity central and suggests that wage differential between men and women with and without children are due to the lack of energy of women with children because of the amount of time and energy they have to put in their family and household. People with children are therefore less productive on their jobs which can have a negative impact on job opportunities and lead to lower wages. In light of this theory, it is possible that a career break can have a positive effect. It could allow employees to build up energy and increase productivity.

As was shown, there is no consensus in the literature on the consequences of career breaks. It is still unclear what the actual effect is of a career break on the subsequent wages nor it is adequately shown what the mechanisms are behind the wage and career development after a career break. With reference to this point, Booghmans et al. (2006) point to possible selection-effects. It is possible that employees who take a career interruption would have made the same career development even without this career break. Employees can for example have less upwards career mobility regardless of a career break because they don't have the ambition; they have less interest in building a 'career' and expanding the social network, People who are motivated to get to the top will work full-time, make over-time and will probably not interrupt their careers. On the other hand, someone who places family life central is more likely to work lesser hours (part-time if possible), to stay at home for a sick child and to take up options like a career break (Booghmans, 2006).

Another drawback of previous research is the limited scope of most studies. In the discussion about the effects of career breaks almost all articles relate it to the gender gap and focus solely

on the effects of parental leave for women (see for example Pylkkänen & Smith, 2003; Dex & Joshi, 1999; Beblo & Wolf, 2000). Few studies examined the differences between men and women. Albrecht et al. (1999) for example found that the negative effects of career breaks were stronger for men than for women in Sweden. On top of that, they found a non-significant effect of parental leave on wages for women. It is remarkable, however, that Beblo & Wolf (2002) used the same models as Albrecht in Germany and found that parental leave had a stronger negative effect on women's wages compared to other types of interruptions. This suggests that the wage effects of career interruptions can also differ between countries with different national labor market institutions and cultural norms and values (Görlich & de Grip, 2007).

2.3 Hypotheses

The wage differentials after taking a career break are central in this study. Persons with a career break will be compared to similar persons without a career break. We will look at wage differentials after the break for men and women separately because they are expected to experience different effects. From the literature, we derive five hypotheses regarding the effects of career breaks on subsequent wages:

- A career break leads to a significant wage loss during the break because the replacement income is much lower. Persons are not likely to receive the same wage after as before the break. Career breaks would not only cause the accumulation of human capital to stop during the break, it can also cause the existing human capital to deteriorate. This can have a negative effect on the productivity of these employees ('*Human Capital Theory*'). Consequently career interrupters will be confronted with relative lower wages after the break than before the break. Comparing people with a career break to people who worked continuously, this process will most likely lead to a wage gap after the break. After the career break, we expect a lower wage for career interrupters compared to continuous workers. People with a career break would have lower initial wages after the break (intercept) than people without a career break.

- The wage loss immediately after the break is followed by a recovery period. During this period, the wage growth of people taking a career break would be faster compared to people without a break because we expect a catch-up effect in work experience *('Human Capital Theory'*). On the long run, the wage losses would therefore be compensated. The growth rates are expected to be significant and positive for people with a career break compared to the growth rate of people without a career break.

- We hypothesize that longer career breaks would have a more negative effect on wages after the break than shorter career breaks *('Human Capital Theory' and 'Signalization Theory'*). Therefore, it is possible that thematic leaves, that are usually short, lead to less wage differentials between people with and people without a break, while part-time or full-time career breaks (in the public sector), that are generally used for a longer period of time, should experience lower wages compared to people without a break. There should be then a clear distinction between types of career breaks, where the wage differential is lower or even non-significant for people with a thematic leave compared to people without a career break, while people with other types of breaks should have higher wage differentials with people without a career break.

- Contrary to the expected wage losses in hypothesis 1, it is also possible a career break can have positive effects on wage levels ('*New Home Economics'*). Because people can build up energy during the break and start again fresh after the break, it is also possible that we find higher wages for people with a career break compared to people without a career break on the long run. In this case, people with a career break would have a positive higher

intercept than people without a career break. It is also possible that the effect is positive on the long run, which means that the growth rates are higher for people with a career break compared to people without a career break, leading to higher wages on the long run for people with a career break.

- Men with a career break are expected to be penalized more on the labor market than women with a career break. The wage differentials among men with and without a break would be higher than the wage differentials among women with and without a break. Since a career break is generally used by women, it is suggested that this is already reflected in the lower wages of women compared to men ('*Statistical Discrimination theory*'). Men on the other hand are not expected to take a career break, and would more likely be stigmatized for doing so ('*Signalization Theory*). An interaction effect between sex and career break is expected to be significant where the initial wage differential after the break among men with or without a break is expected to be higher than the wage differential among women with or without a break. It is, however, unclear how this will play on the long run.

3. Data and Methods

3.1 Data

In order to answer the research questions, longitudinal data are needed with an adequate representation of the number of people who took a career break in the past. Both requirements are met by using administrative data. These data are managed by the Datawarehouse Labour Market and Social Security that collects data from various social security institutions in Belgium. We took a sample of this administrative data with information on individuals living in Flanders. The data we have at our disposal span the period from the second quarter of 1998 to the fourth quarter of 2006. A great advantage of using administrative data for this research is the fact that incomes are fairly accurate and complete in contrast to surveys where a high non response is commonly found for income questions. We can examine the wage differentials after the break as well as the differentials in subsequent wage growth. We have information on the length and number of career breaks in this period. It was also possible to select sufficient persons with a career break whereas in general social surveys the number of people would be (too) low.

Each year, 10% of the number of people of each type of career break was selected from the administrative data: part-time career break (public sector), part-time career break (private sector), full-time career break (public sector), full-time career break (private sector), and thematic leaves. A total of 90 414 individuals were randomly selected. The data allows us to examine the longitudinal paths of individuals from 1998 to 2006. In order to compare the wages and wage growth, a 'control group' was designed where the same number of working people without a career break was randomly selected each year (total of 90 414). This second 'control' group was also sampled to match the career interrupters on age and gender every year. This is done by sampling the same amount in every category (male/female and age).

For the analyses, additional selections were made after the initial sampling to control for certain characteristics. For example, we used persons with only one career break, because it is possible that these persons were selected more than once and had a break of more than one year. Of the 90 414 persons approximately 80% had taken one career break (69 023). The year 2003 will be our starting point in the analyses (Time= 0). A selection was therefore made of people that ended their career break in 2003 (a total of 5 367 people). From the control group, we selected the sample of 2003 (a total of 8 259 people). The selection of the year 2003 is done for several reasons. First, we wanted to control for possible period-effects. Because the persons are spread over the years, possible wage differences could be due to different times at which they were observed. Second, it allows us to examine part-time career breaks that are generally used for 4 or 5 years. We were also able to include the new career break scheme in the private sector (from 2002), albeit for a short period of time (maximum 1 year).

3.2 Methods

The research questions will be tested with multilevel models for change also known as longitudinal growth models (Singer & Willet, 2003). It is a better way to examine these data than traditional regression analyses because longitudinal data can be seen as multilevel-data with repeated measures nested within individuals. It also allows us to be more flexible in the assumptions imposed on the models. The classical assumptions in OLS regression analyses, i.e. independent and identically distributed residuals, and homoscedastic variance across occasions and individuals, are less credible in longitudinal data (Singer & Willet, 2003).

Longitudinal data leads to a two-level model, with the repeated measures on the first level and the individual persons on the highest level. The repeated measures are represented in the variable 'Time' from 2003 to 2006. Time has been centered in 2003. The career break ends in

2003, but the exact timing can vary across individuals (first, second, third or fourth quarter). The fact that the number of time points is not equal for all respondents poses no problem in multilevel modeling. It does not require a balanced dataset, which is an advantage in longitudinal data where missing values often occur for some points in time (Hox, 2002). When an unbalanced dataset has sufficient time points and a sufficient number of people, the models do not have to be altered and no problems will occur (Singer & Willet, 2003).

The wage income will be the dependent variable. We use the gross income measured on quarterly basis. For each quarter, the incomes are adjusted for inflation with 2004 as the base year. Based on the health index[2] we corrected the incomes in the dataset. To linearize the individual wage trajectories and to address the skewness commonly found in income data, the natural logarithm of income is modeled in our analyses. For the interpretation of the results, the income will be translated back to the original scale in euro (by taking the antilog). The temporal variable 'Time' identifies the quarters and begins in 2003 with time equal to zero.

[2] http://economie.fgov.be/nl/modules/publications/statistiques/economie/prix_a_la_consommation_a_partir_de_1920_et_indice_sante_a_partir_de_1994.jsp: we calculated the average percentage per quarter. This percentage was then divided by 100 and multiplied with the income of that quarter in the dataset.

4. Results

The analyses examine longitudinal growth models for persons younger than 50 years. In the analyses we will begin by fitting two simple models: the unconditional means model and the unconditional growth model. These unconditional models partition and quantify the outcome variation in two important ways: the first model describes the amount of variance on each level across people regardless of time, and the second model across both people and time by including time as a predictor in the model to examine the wage growth after the break at re-entry on the labor market. These models allow us to examine whether there is systematic variation in outcome that is worth exploring and where the variation is located (between or within people) (Singer & Willet, 2003). Both models also provide baselines for subsequent comparisons of following models where we add substantive predictors, like career break type and gender on the second level to explain the variance between persons.

4.1 Descriptive overview of the 2003-subsample

We briefly give an overview of the sample by means of descriptive analyses. In **Table 4**, a group of a 5 356 people with a career break and a group of 8 259 people without a career break are compared on age and gender. In both groups, women are dominantly present in comparison to men (5 669 to 2 590 in the control group and 4 050 to 1 306 career interrupters). It can be seen that the percentages are rather similar in both groups. The majority of the sample consists of women between 25 and 49 years (75,98% and 82,55%) and men of 50 years or older (55,82% and 58,42%). There are slightly more women, who are 50 years or older in the career break group (22%) compared to the control group (16%). The youngest age categories are underrepresented in each group for men as well as for women.

Table 4: People with a career break and people without a career break across age and gender

	With Career Break						Without Career Break					
	Men	**%**	**Women**	**%**	**Total**	**%**	**Men**	**%**	**Women**	**%**	**Total**	**%**
< 25	13	*1,00*	74	*1,83*	87	*1,62*	14	*0,54*	93	*1,64*	107	*1,30*
25-49	564	*43,19*	3 077	*75,98*	3 641	*67,98*	1 063	*41,04*	4 680	*82,55*	5 743	*69,54*
>= 50	729	*55,82*	899	*22,20*	1 628	*30,40*	1 513	*58,42*	896	*15,81*	2 409	*29,17*
Total	1 306	*100,00*	4 050	*100,00*	5 356	*100,00*	2 590	*100,00*	5 669	*100,00*	8 259	*100,00*

In Table 5, we can see how our sample of people taking a career break is divided across the age categories and type of career break for men and women. As shown in **Table 4**, most people taking a career break are female (4 050 or 75%). There are considerable differences across type of career break. Most men take a part-time break, especially in the public sector. While the part-time breaks are primarily situated among men aged 50 years or older, the full-time options are most popular in the middle age category (25-49 year). Also the thematic leaves are primarily used by the middle aged men. Most women take a part-time career break. This type of break is also popular among the women aged 50 or older, but in contrary to men the majority still can be found in the middle age category. Significantly less women opt for a full-time break. The majority of full-time users are middle aged. Thematic leaves are also very successful among women, where 91% belongs to the middle age category.

Table 5: Gender and age by type of career break

		part-time (public)	%	full-time (public)	%	thematic	%	part-time (private)	%	full-time (private)	%	Total	%
Men	< 25	0	*0,00*	2	*1,29*	4	*0,00*	1	*0,47*	6	*3,03*	13	*1,00*
	25-49	105	*19,23*	91	*58,71*	176	*89,80*	57	*27,01*	135	*68,18*	564	*43,19*
	>= 50	441	*80,77*	62	*40,00*	16	*80,77*	153	*72,51*	57	*28,79*	729	*55,82*
	Total	*546*	*100,00*	*155*	*100,00*	*196*	*100,00*	*211*	*100,00*	*198*	*100,00*	*1 306*	*100,00*
Women	< 25	3	*0,15*	1	*0,00*	57	*4,94*	1	*0,61*	12	*5,33*	74	*1,83*
	25-49	1 296	*66,06*	416	*76,33*	1 052	*91,16*	117	*71,34*	196	*87,11*	3 077	*75,98*
	>= 50	663	*33,79*	128	*23,49*	45	*3,90*	46	*28,05*	17	*7,56*	899	*22,20*
	Total	*1 962*	*100,00*	*545*	*100,00*	*1 154*	*100,00*	*164*	*100,00*	*225*	*100,00*	*4 050*	*100,00*

These findings are in accordance to the descriptive statistics that were presented earlier from the RVA (2010). It seems that the public sectors are overrepresented among the career interrupters, and especially the part-time option. From the evolution in previous section, we saw that this ratio (public/private) changes throughout the years where part-time breaks in the private sector will become more important than the public sector and that thematic leaves will also become more successful among men.

For the analyses, a final selection has been made to include only people under the age of 50. This has been done because the career break motives of people younger than 50 and people of 50 years or older are of a different nature and relate to different social outcomes. Whereas the latter group generally uses a career break as an end of the career measure, the first group has other motives for taking a career break. It is also more probable that the older group career interrupters do not return to the labor market afterwards. It is therefore impossible to examine the wage differentials after the break for these people.

Table 6: Number of years (quarters) in break by type of career break

Number of years in career break	part-time (public)	%	full-time (public)	%	thematic	%	part-time (private)	%	full-time (private)	%	Total	%
<= 1 year (1-4q)	154	*6,1*	101	*14,3*	1 013	*74,9*	217	*57,9*	281	*65,9*	1 766	*32,9*
1-2 years (5-8q)	344	*13,7*	111	*15,7*	203	*15,0*	148	*39,5*	79	*18,5*	885	*16,5*
2-3 years (9-12q)	429	*17,1*	102	*14,5*	56	*4,1*	2	*0,5*	27	*6,3*	616	*11,5*
3-4 year (13-16q)	392	*15,6*	91	*12,9*	30	*2,2*	6	*1,6*	13	*3,1*	532	*9,9*
4-5 years (17-20q)	632	*25,2*	186	*26,4*	28	*2,1*	2	*0,5*	11	*2,6*	859	*16,0*
+5 years (+20q)	558	*22,2*	114	*16,2*	22	*1,6*	0	*0,0*	15	*3,5*	709	*13,2*
Total	*2 509*	*100*	*705*	*100*	*1 352*	*100*	*375*	*100*	*426*	*100*	*5 367*	*100*

From the 5 367 career interrupters, 2509 took a part-time break in the public sector (**Table 6**). A part-time break is generally taken up for more than 1 year. As we can see in the table, most people taking a part-time break (public sector) interrupted their career for 4 to 6 years. The thematic leaves are commonly a lot shorter and are used for breaks of less than 1 year (75%). A total of 1 352 persons took a thematic leave. There are 705 (public) and 426 (private) people with a full-time career break. The duration of this type of break in the public sector is primarily 4 to 5 years. The private breaks are almost only 1 year of duration, from 2002 until 2003, as the breaks in the private sectors exist since 2002. In the table, we see that there are nevertheless also people with longer career breaks, which could indicate a transition from the old system.

Table 7: People with a career break and people without a career break according to the LIPRO-household typology

	With Career Break		Without Career Break	
	Frequency	**%**	**Frequency**	**%**
1. Single	347	6,5	904	10,9
2. Married without children	983	18,3	1 318	16,0
3. Married with children	2 906	54,2	3 751	45,4
4. Child with married couple	121	2,3	433	5,2
5. Living together without children	156	2,9	582	7,0
6. Living together with child(ren)	430	8,0	438	5,3
7. Child with non-married couple	3	0,1	13	0,2
8. Head single parent household	237	4,4	498	6,0
9. Child in one parent household	75	1,4	140	1,7
10. Other resident	38	0,7	66	0,8
11. Other persons	60	1,1	107	1,3
12. Living in collective household	8	0,1	9	0,1
	5 364	100,00	8 259	100,00

By using the LIPRO typology the household position of people with and without a career break is shown in **Table 7**. We can see that the career break group consists of more married people with children (54,2%) than the control group (45,4%). Within the group of people taking a career break, we can see that among this groups using the opportunity to take a break is the most popular. Furthermore, there are more married persons without children in the former group (18,3%), as in the latter (16%). The control group on the other hand consists of more single persons (11%) than the career break group (7%). The other categories have rather low percentages in both groups. Some differences in household position between people with and without a career break can be seen, suggesting that there is possibly a selection-effect.

Table 8: Full-time and part-time breaks by age and gender

	Full-time				Part-time			
	Men	**%**	**Women**	**%**	**Men**	**%**	**Women**	**%**
< 25	802	*3,42*	2 787	*5,46*	132	*1,53*	1 784	*2,96*
25 - 49 yrs	12 650	*53,91*	39 451	*7,.30*	3 281	*38,01*	47 770	*79,14*
>= 50 yrs	10 014	*42,67*	8 799	*17,24*	5 220	*60,47*	10 805	*17,90*
Total	23 466	*100,00*	51 037	*100,00*	8 633	*100,00*	60 359	*100,00*

Table 8 compares full-time and part-time breaks across age and gender. Full-time career breaks are generally taken up between the age of 25 and 49. Women in this age category disrupt their career the most, part-time (79,1%) as well as full-time (77,3%). Full-time career breaks are among men also most popular in this middle age category. Most male part-time interrupters (60,5%), are 50 years or older. These findings are in accordance with the findings

indicated earlier in this report: for men interrupting their career is predominantly done at a later age. The strategy is used as an early exit pathway to retirement.

4.2 The unconditional means model

The unconditional means model (Model 1) does not describe change in the outcome over time. There are no predictors included in this model. This model is a so-called null model allowing only variations in intercept. We have specified the level 1 and level 2 equations and the composite equation in **Table 9**. The wage trajectory (ln_inc or ln_y_{ij}) of a particular individual i after 2003 is flat since there are no slopes. This model only gives time-constant averages. The average of ln_y_{ij} for individual i is π_{oi}. The average of ln_y_{ij} for all individuals is γ_{OO}. E_{ij} is the variance on level 1 which is the spread around the person specific ln_inc level over the quarters. ζ_{oi} is the variability of the average of ln_inc between persons on level 2 that can possibly be explained by introducing covariates on this level.

In the null model, the average ln_y_{ij} is 8,467 throughout the observational time for both the control group and the group of career interrupters. The average income is 4,755 ($e^{8,467}$) euro/quarter or 1.585 euro /month during the whole time period. On time j, ln_y_{ij} varies of the average of individual i (π_{oi}) with E_{ij}. All parameters are statistically significant. We therefore reject the null hypothesis for each (p-level < 0.001) that the average income of people between 2003 and 2006 is zero.

The null model is always the first model to be estimated because it describes and partitions the outcome variation. The residual on level 1 represents the *within person* (σ_E^2) variation and the residual on level 2 represents the *between person* (σ_o^2) variation. The variances measure the variability of the deviations of the entire population. The *within person* (σ_E^2) variation represents the spread of income over time of every individual around its own average while the *between person* (σ_o^2) variation gives the spread of the person-specific averages around the overall average. The null model is estimated in order to estimate the amount of variance on each level. Both variance components are significant different from zero (σ_E^2: 0.145 and σ_o^2: 0.411 with p-level <0.01). If it were zero, there would be little point in trying to predict the outcome variation at that level. For now we can say that there are significant variations in average incomes of individuals as well as in incomes between individuals that could potentially be explained. To look at the amount of variation on each level, we calculate the intraclass correlation coefficient (ICC) or the proportion-variance on the person level. The ICC describes the proportion of the total outcome variation that lies *between* people.

$$\text{Intraclass correlation coefficient (ICC)} = \rho = \sigma_o^2 / (\sigma_o^2 + \sigma_E^2) = 0{,}76$$

From this calculation, we see that 76% of the variation in income (ln_inc) is due to variation between individuals and 24% to variation within individuals over time. In the observed 16 quarters from 2003 to 2006, we can say that 24% of the variation in income can be ascribed to variation of income within the wage trajectory of each individual, or how each person changes over time, while 76% of the variation of income is due to variation between individuals, or how these changes differ across people, e.g. differences between people with and people without a career break and differences between men and women. In the next models, we will try to explain the variation between individuals by introducing covariates on the second level.

Table 9: Taxonomy of multilevel models for change

	Level 1/Level 2 specification		
	Level 1 model	**Level 2 model**	**Composite model**
Model 1	$Ln\_y_{ij} = \pi_{0i} + E_{ij}$	$\pi_{oi} = \gamma_{00} + \zeta_{0i}$	$Ln\_yij = \gamma_{00} + (\zeta_{0i} + E_{ij})$
Model 2	$Ln\_y_{ij} = \pi_{0i} + \pi_{1i} * TIME_{ij} + E_{ij}$	$\pi_{Oi} = \gamma_{00} + \xi_{0ij}$ $\pi_{1i} = \gamma_{10} + \xi_{1ij}$	$Ln\_y_{ij} = \gamma_{00} + \gamma_{10}*TIME_{ij} + (\xi_{0ij} + \xi_{1ij}*TIME_{ij} + E_{ij})$
Model 3	$Ln\_y_{ij} = \pi_{0i} + \pi_{1i} * TIME_{ij} + E_{ij}$	$\pi_{Oi} = \gamma_{00} + \gamma_{01}* Break_i + \xi_{0i}$ $\pi_{1i} = \gamma_{10} + \gamma_{11}* Break_i + \xi_{1i}$	$Ln\_y_{ij} = [\gamma_{00} + \gamma_{01}*BREAK_j + \gamma_{10}*TIME_{ij} + \gamma_{11}Break_i*TIME_{ij}] + [\xi_{0i} + \xi_{1i}*TIME1_{ij} + E_{ij}]$
Model 4	$Ln\_y_{ij} = \pi_{0i} + \pi_{1i} * TIME_{ij} + E_{ij}$	$\pi_{0i} = \gamma_{00} + \gamma_{01}* Break_i + \gamma_{02}* SEX_i + \xi_{0i}$ $\pi_{1i} = \gamma_{10} + \gamma_{11} * Break_i + \gamma_{12}* SEX_i + \xi_{1i}$	$Ln\_y_{ij} = [\gamma_{00} + \gamma_{01}*BREAK_j + \gamma_{02}*SEX_i + \gamma_{10}*TIME_{ij} + \gamma_{11}Break_i *TIME_{ij} + \gamma_{12}*SEX_i *TIME_{ij} *] + [\xi_{0i} + \xi_{1i}*TIME_{ij} + E_{ij}]$

4.3 The unconditional growth model: Modeling time

The unconditional growth model (Model 2) is a model with only time as a predictor (model 2a). No other covariates are taken into account. The fixed effects estimate the intercept (or starting point) and the slope of the average population change trajectory. The intercept is equal to 8,365 which measures the income right after the break in 2003. In this year, people have an average income of 4294 euro/quarter ($e^{8,365}$) or 1431euro/month. The estimations for the intercept (time) in rate of change indicates a linear increasing trend of income over time. The wage growth of ln_inc is 0.017 per quarter. Because the outcome is expressed on a logarithmic scale, its parameter estimate γ_{10}, is not a linear growth rate. A transformation of $100(e^{\gamma 10} -1)$ leads to a percentage change in Y (income) per unit difference in X (one quarter). This yields a quarterly percentage growth rate in wages. The average wage grows each quarter with 1.7% so we can say that on average, the ln_inc increases linearly over time each quarter from 2003 until 2006 across all people.

The interpretation of the variance components is different from previous model. The level 1 residual variance σ_E^2 now summarizes the scatter of each person's data around his or her own linear change trajectory in log income (not his/her person specific mean). This model fits the data better than previous model since both variance components declined. This is also confirmed with lower AIC and BIC compared to model 1 in the fit parameters. These variances are still significantly different from zero (σ_E^2: 0,139 and σ_0^2: 0,409 with p-level <0.01). After the inclusion of time there is still some variance that can be explained further.

Because people can have variable initial wages as well as variable wage growths, we also included the time-variable as a random variable in the model (model 2b). It hardly changes the estimates, but it fits the data significantly better (lower Chi²/deviance, AIC and BIC). The variance components of the intercept as well as the time variable differ significantly from zero. The level 2 residual variances σ_0^2 and σ_1^2 now summarize between-person variability in initial status and rates of change. A significant intercept variance implies that the individuals have different initial status/values (σ_E^2: 0,119 with p-level <0.001). Different variations of time indicates a significant variation between individuals in growth curve or income change (σ_0^2: 0,439 and σ_1^2: -0,005 with p-level <0.01). A significant positive covariance component, σ_{01}^2: 0,001 (with p-level <0.001), suggests that there is a positive correlation between the initial wage and the subsequent wage growth. People with higher initial wages would thus also experience a higher wage growth then people with lower initial wages. In the next models, we will try to explain the wage differences in initial wage and growth by including time-invariant covariates on the second level.

Table 10: Results of multilevel models for wage differentials after a career break (n=9465)

		parameter	model 1		model 2a		model 2b		model 3		model 4	
Fixed effects												
Initial Status	Intercept	γ00	8,486	***	8,365	***	8,365	***	8,436	***	8,371	***
	BREAK (dum)	γ01							-0,179	***	-0,149	***
	MEN	γ02									0,364	***
	MEN*BREAK	γ03									-0,116	**
Rate of change	Intercept (TIME)	γ10			0,017	***	0,016	***	0,014	***	0,014	***
	BREAK	γ11							0,007	***	0,007	***
	BREAK*MEN	γ12									-0,002	ns
	MEN	γ13									0,001	ns
Variance components												
Level 1	Within person	σE^2	0,145	***	0,139	***	0,119	***	0,119	***	0,119	***
Level 2	In initial status	$\sigma 0^2$	0,411	**	0,409	**	0,439	**	0,432	**	0,416	**
	In rate of change	$\sigma 1^2$					-0,005	***	-0,005	***	-0,005	***
	Covariance	$\sigma 01^2$					0,001	***	0,001	***	0,001	***
	Deviance		135995,78		131329,23		125399,137		125248,611		124954,149	
	p		3		4		6		8		12	
	AIC		136001,78		131337,23		125411,137		125264,611		124978,149	
	BIC		136030,78		131375,9		125469,14		125341,949		125094,156	
	Δ Dev				4667	1	10597	2	151	2	294	8

*** p-level <0.001 **p-level <0.01 *p-level <0.05 ns=not significant

4.4 Growth models with covariates into the model

In the next model (Model 3), we include the dummy variable "break" (having a career break or not) as a predictor of both initial and change in wages after 2003. This is the main focus of the study since we want to measure the impact of career breaks on wages at re-entry and subsequent wage growth. The model improved significantly (for 2 df, Deviance Chi²: 151>13,82 with p-level of 0.05). Break is a dummy variable with 0 for people without and 1 for people with a career break. In model 3, the estimated initial wage in 2003 for people without a career break is 1 537 euro/month ($e^{8,436}/3$). The estimated difference in wage in 2003 between people with and people without a career break is 252 euro/month ($e^{8,436}/3$ - $e^{8,436-0.179}/3$). The estimated wage growth after the break for people without a career break is 0.014 in ln_inc per quarter. People with a career break have a higher growth rate (or rate of change) in ln_inc (+0.007) compared to people without a career break which means there is evidence of a *recovery effect* in wage after the break.

This recovery is only partly due to the difference in income derived from the career break benefit towards the wage income when people start working again. Immediately after the break, we observe significant differences in wage incomes, but the growth rate suggests there is evidence of a recovery period in wage income some quarters after the break. The parameters are all significant (p-level <0.001) so we can reject the null hypothesis that there are no differences between people with and people with a career break in initial wages and in rate of change. By introducing the dummy variable nothing changed on the level 1 variance component (σ_E^2), which is as expected since no time-varying predictor was added on the level 1. The level 2 variance did decline slightly from 0.439 to 0.432 for initial status (σ_0^2). The variances are still significant, suggesting there is room for other predictors to explain the differences in wages between people. In the next model, we introduce the effect of gender to try to explain these differences further.

In the literature, there are some indications of differences between men and women. Because of the sample size of the register data, one of the main advantages of this study is the possibility to look at the gender differentials in income changes, especially for men who take a career break. In model 4, we introduce the gender variable (SEX). Again we see that this model is significantly better than model 3 because the deviance is significant lower in model 4 (a deviance of 294 for a difference of 4 degrees of freedom in a Chi-square distribution is significant with 99,9% probability level). This is confirmed by the lower AIC and BIC for model 4 compared to model 3. This suggests that controlling for gender significantly improves our model. Model 4 shows that the initial wage for women without a break is 1440 euro/month ($e^{8.371}/3$). The difference in initial wage in 2003 for women that took a career break is 231 euro/month ($e^{8.371}/3$ - $e^{8.371-0.179}/3$). Men without a break have significant higher wages than women without a career break (2072 euro/month). The difference in wages in 2003 between men with and men without a career break is 482 euro/month ($e^{8.371+0.364}/3$ - $e^{8.371+0.364-0.149-0.116}/3$) less for men with an interruption.

These parameter estimate are all statistical significant on p-level 0.01, so we can reject the null-hypothesis that there are no differences between men and women, between people with and without a career break and the interaction effect of gender and having a break in initial wages after the break. After the break, the wage growth for women without a career break is 0.014 in ln_inc. Women with a career break have a higher wage growth compared to women without a career break (0.021: 0.014+0.007). In the model, we can see that the parameters in rate of change of MEN and of the interaction effect of MEN*BREAK are not significant. This means that these estimates are statistically not significantly different from zero (on p-level <0.05) and we can say there are no differences in wage growth after the break between men and women with

a career break, nor are there significant differences between wage growth between men and women without a career break.

The variance in initial state between persons diminished with 4% (0.432 to 0.416). Since these variance components remain significant, there are still differences that are not explained by including BREAK and SEX. Since there are significant differences between men and women, we will examine both separately in the next analyses. We will also distinguish between different types of career break. As we have seen, there are 5 types of career breaks (formal career break part-time, formal career break full-time, thematic leaves, time credit part-time and time credit full-time).

Table 11: Results of the multilevel models for wage differentials after a career break in 2003 for men (n=1 628) and women (n=7 837)

			WOMEN				MEN			
		parameter	model 5		model 6		model 7		model 8	
Fixed effects										
Initial Status	Intercept	γ00	8,371	***	8,564	***	8,736	***	8,741	***
	part-time (public)	γ01	0,003	ns	-0,059	**	-0,304	***	-0,354	***
	full-time (public)	γ02	-0,546	***	-0,404	***	-0,706	***	-0,597	***
	thematic	γ03	-0,182	***	-0,126	***	-0,051	ns	-0,035	ns
	part-time (private)	γ04	-0,172	**	-0,236	***	-0,029	ns	-0,052	ns
	full-time (private)	γ05	-0,479	***	-0,423	***	-0,441	***	-0,208	**
	No children				ref				ref	
	1 Child	γ06			-0,083	***			-0,003	ns
	2 Children	γ07			-0,149	***			-0,003	ns
	3 or more children	γ08			-0,206	***			0,01	ns
	No children				ref				ref	
	Child <6y	γ 09			-0,049	***			0,026	ns
	Child 6-12y	γ 010			-0,024	*			0,021	ns
	Age	γ011			0,003	ns			0,001	ns
	Age²	γ012			-2E-04	ns			0,0004	ns
	Income 1998	γ013			0,307	***			0,349	***
Rate of change	Intercept (TIME)	γ10	0,014	***	0,014	***	0,014	***	0,014	***
	part-time (public)	γ11	0,004	**	0,002	ns	0,007	ns	0,005	ns
	full-time (public)	γ12	0,014	***	0,009	**	-0,0003	ns	-0,006	ns
	thematic	γ13	0,008	***	0,008	***	0,004	ns	0,006	ns
	part-time (private)	γ14	0,015	***	0,012	**	-0,003	ns	0,002	ns
	full-time (private)	γ15	0,015	***	0,011	**	0,014	**	0,007	ns

Variance components										
Level 1	within person	σE^2	0,124	***	0,109	***	0,098	**	0,088	**
Level 2	In initial status UN(1,1)	$\sigma 0^2$	0,415	**	0,283	**	0,339	*	0,221	*
	In rate of change UN(2,1)	$\sigma 1^2$	-0,005	***	-0,003	***	-0,003	***	-0,001	***
	Covariance UN(2,2)	$\sigma 01^2$	0,001	***	0,001	***	0,001	***	0,001	***
	Deviance		107389,067		72941,943		16903,903		11682,89	
	p		16		24		16		24	
	AIC		107421,067		72989,943		16935,903		11730,89	
	BIC		107572,865		73211,896		17061,711		11914,686	
	Δ Dev				34447	8			5221	8

*** p-level <0.001 **p-level <0.01 *p-level <0.05 ns=not significant

4.5 Growth models with additional covariates (women)

In model 5, we look at the wage differentials among the different types of career breaks for women. Women without a career break have an income of 1 440 euro/month ($e^{8.371}/3$). The initial wage differential is the lowest between the women without break and women with a part-time break. This difference is not significant for women with part-time break in the public sector while for a part-time break in the private sector this is 228 euro/month ($e^{8.371-0.172}/3$). The difference between women without a break and women with a thematic leave is 240 euro/month ($e^{8.371-0.182}/3$) immediately after the break in 2003. The initial difference between women without a break and with a full-time break is the highest. Women with a full-time break in the public sector earn 606 euro/month ($e^{8.371-0.546}/3$) less than women without a career break, while women with a full-time break in the private sector earn 548 euro/month less ($e^{8.371-0.479}/3$).

After the break, the wage growth for women without a break is 0.014 in ln_inc. Women with a career break have a significant higher wage growth. Nevertheless, there are significant differences in type of break: all parameter estimates are highly significant. The part-time break in the public sector has a significant larger wage growth (0.014+0.004: 0.018), although there was no significant initial wage differential. In the private sector, women with the part-time break have a differential wage growth of 0.015. Women with a thematic leave grow 0.008 ln_inc/quarter more than women without a career break. Women with a full-time career break in the private and in the public sector show a significant higher wage growth after the break per quarter compared to women without a career break of 0.028 (0.014+0.014) and 0.029 (0.014+0.015) respectively.

Summarizing, we observe that women with part-time breaks experience the smallest wage differential (or even non-significant in the public sector) compared to women without a career break. Women with a thematic leave have a significant wage loss after the break in 2003. Full-time interrupters are confronted with the highest wage loss in 2003. After the break the wage growths are higher for women with a break compared to women without a break. This means women with a break seem to experience a 'recovery' period for the initial lower wages. For women in the part-time break in the public sector however there was no initial difference, but a higher wage growth, suggesting that on the long run they would have higher wages after the break compared to women without a career break.

In model 6, we include additional covariates that might further influence the income level. We introduced family-related covariates: the number of children and age of the youngest child. We control for (centered around mean=36) age and also for the (centered around mean: 2951 euro/quarter) income of 1998 to control for income level before the break for people with and people without a career break. In this way, we control for selectivity in the entry into the career break scheme. Different models were estimated where the covariates were introduced one by one. We only present our "final" model (model 6) with all covariates included. The intercept now refers to women without a career break, without children, of the average age (=36 years), with an average income in 1998. They have an initial income of 1 747euro/month ($e^{8,564}/3$). The effect of age is not significant (with p-level<0.05). Women with children have significant lower wages compared to women without children. The more children women have, the lower the wages are. Also the age of the youngest child plays an important role. Women with a child younger than 6 years, have an initial wage differential of 83 Euro/month ($e^{8,564}/3$- $e^{8,564-0,049}/3$) compared to women without children. Women with a child between 6 and 12 years, have an initial wage differential of 41 Euro/month ($e^{8,564}/3$- $e^{8,564-0,024}/3$) compared to women without children. The higher the wage in 1998, the higher the income in 2003 (+ 0.349).

After controlling for age of children, number of children, age and income of 1998, the initial difference in wages between women without a break and women with a part-time break are the lowest. The difference in wages with part-time break in the public sector is 100 euro/month ($e^{8,564}/3$- $e^{8,564-0,059}/3$) (p-level <0.01), while the difference in wages with part-time in the private sector is 367euro/month ($e^{8,564}/3$- $e^{8,564-0,236}/3$). The initial difference between women without a break and women with a thematic leave has decreased slightly to 206 euro/month ($e^{8,564}/3$- $e^{8,564-0,126}/3$). Women with a full-time break still have much lower wages in 2003 than women without a break, although also here the estimated incomes are lower after controlling for these covariates. Women with a full-time break in the public sector have 580 euro/month ($e^{8,564}/3$- $e^{8,564-0,404}/3$) lower wage than women without a break, while women with a full-time break in the private sector have 602 euro/month ($e^{8,564}/3$- $e^{8,564-0,423}/3$) lower wages than women without a break.

Women without a career break have a wage growth of 0.014 in ln_inc after the break. Women with a part-time break in the public sector do not differ significantly in change of rate from women without a break. The growth rates are the same (0.014). They also had the smallest wage differential in 2003. The wage growth for women with a part-time break in the private sector is 0.026 (0.014+0.012). Also women with a full-time break, in public and in the private sector, have higher wage growth compared to women without a break of 0.023 (0.014+0.009) and 0.025 (0.014+0.011) respectively. Women with a thematic leave have a wage growth of 0.022 (0.014+0.008). Except for the part-time break in the public sector, there are higher wage growths for women with a career break compared to women without a career break.

The model fits the data better than model 5 (lower deviance and lower AIC and BIC). The control variables seem to predict a part of the differences between women with and women without a break, but not all of it. This can be confirmed by the variance components where there is a decrease in variance in initial status, but there is still significant variance left to explain. By adding 'INCOME 1998' the variance within persons decreased with 22% (σ_E^2: from 0.124 to 0.109). There is also a drop in variance on the second level (between persons) of 32% which is mainly due to control for income in 1998. The remaining differences between persons are due to other factors that cannot be explained. The current data does not allow including characteristics like education and work-related variables.

4.6 Growth models with additional covariates (men)

In model 7, we examine differentials between different career break types among men. Men without a career break have an initial wage of 2074 euro/month ($e^{8,736}/3$). There are no significant differences between these men and men with a thematic leave or with a part-time break in the private sector. There are however huge differences among the other types of career break. Men with a part-time break in the public sector have an initial wage of 1531 euro/month ($e^{8,736-0.304}/3$) which is 534 euro/month less than men without a break. Men with a full-time break in the public sector are confronted with wages 1050 euro/month less than men without a break in 2003, a full-time break in the private sector leads to a lower wage of 873 euro/month less than men without a break.

Men with a full-time break experience considerable lower wages compared to men without a career break. The fact that this effect is lower in the private sector can be due to the fact that these breaks are much shorter (since the breaks in the private sectors could only be observed for one year). This can also be a factor for the difference in part-time break, where the differential in the private sector is not significant. Men with a thematic leaves do not experience lower initial wages suggesting that these short periods of leaves will not lead to great wage losses for men. The wage growth for men without a break is 0.014 in ln_inc per quarter. There are no differences in wage growth between men without a break and men with a break except

for men with a full-time break in the private sector who show an additional increase in wage growth of 0.014 ln_inc per quarter.

In model 8, we included the same covariates as we did in model 6 for women. Men without a career break without children of average age (=38 year) and with an average income in 1998 (=4 230 euro/quarter), have an initial wage of 2 085 euro/month ($e^{8.741}/3$). The number of children nor the age of the youngest child have a significant impact on wages of men in 2003. Age also does not seem to have a significant influence on initial wages. As income in 1998 is higher, the initial wage in 2003 is also higher (+0349).

After control for the number of children, age of youngest child, age and income in 1998, the initial differences between men without a break and men with a full-time break in the public sector is 937 euro/month (vs 1 050 euro/month before control). Also the differential between men without a break and men with a full-time break in the private sector has decreased to 391 euro/month (vs 873 euro/month before control). Again, there is no significant difference in wages between men without a break and men with a thematic leave or men with a part-time break in the private sector in 2003.

The wage growth for men without a career break is 0.013 in ln_inc per quarter. There are no differences in rate of change in wage for men without a career break and men with a career break (regardless of type of break) after control for age, income in 1998 and child-related variables. There is a decrease in variances within as well as between individuals, but it remains significant. There is still some variance left on both levels that is not explained by these predictors.

5. Discussion and Conclusion

From these analyses, we can see that there are significant differences in initial wages in 2003 and changes in wage trajectories after 2003 between people with a career break compared to similar people without a career break. The wage differentials are much higher between men with and without a break than between women with and without a break. Moreover, we see that women with a break show a significant larger wage growth after the break than women without a break. For men, we observe no significant differences in wage growth after the break. Men seem to be 'penalized' more on the labor market in terms of wage than women for taking a career break.

This male penalty can be due to the fact that men are stigmatized more for taking a break. Since it is not common for men, this can send a signal of being less committed to their job, and hence lead to lower wages (signalization theory). According to the statistical discrimination theory, the lower wage loss found for women could also be due to the fact that women are penalized on the labor market with lower wages regardless of a career break because employers already anticipate a potential break.

By examining different types of career breaks, we can see that women with a career break, regardless of the type of career break, have significant lower wages than women without a break after controlling for age, income of 1998 and child-related covariates. Men with a career break have lower wages than men without a career break, except for men with thematic leaves and men with a part-time break in the private sector after controlling for age, income of 1998 and child-related covariates. Remarkable was the fact that the child-related variables did not have a significant effect on the wages (differentials) of men which might suggest men take career breaks for personal or work-related reasons.

Among men and women, those with full-time breaks, either public or private, seem to have the highest wage differential after the break compared to people without a break. This is possibly due to the fact that they are totally disconnected from their job for a certain period of time. This can be explained by the loss of human capital that even deteriorates during the period. But it can also be explained in terms of the signalization theory where a full-time break can send a stronger signal of less job commitment than the other types of career breaks.

Women with a part-time break, either public or private, also have lower wages compared to the continuous working women, but because they keep a link to their job, it is possible the wage differential is far less extensive than among full-time interrupters. Women with a thematic leave experience only a slightly lower wage than women without a break. Men did not have a lower wage after a thematic leave compared to men without a break. The additional wage growth among women after the leave suggesting the wage differential would disappear in the long run (catch-up effect). A possible explanation is that thematic leaves are popular and socially acceptable, and therefore does not send a signal of lesser work commitment leading to low or even non-significant wage differentials. Thematic leaves are also generally used less than 1 year. The smaller duration of this type of career break can also explain these small wage differentials.

The wage differentials for men were a lot smaller or even non-significant for the breaks in the private sector. Only the breaks of 1 year could be examined. It could be a sign that for men the duration of the break is an important factor seeing wage differential for thematic leaves and for part-time in the private sector were not significant, and the wage differential found for full-time breaks in the private sector was considerably less than the wage differential for full-time breaks in the public sector.

For men as well as for women, there was still some unexplained variance left on both levels, within persons (level 1) and between persons (level2: initial status and rate of change). There are potential other predictors that can explain these wage differences on both levels, that could not be examined or included in the models since the amount of available variables was limited. There was for example no information on education (not available in administrative data), or other work-related variables that were only attained for people with a career break (full-time/part-time, working hours, quality of work).

Because of these limitations, we can only explain the wage differentials partially. Because of the profile of people who are inclined to take a career break, the differences in wages can also be due to selection effects. It is probable that specific groups of employees select themselves in the career break scheme. This could be persons with lower labor market commitment and less ambition to make promotions. It could be the case that these persons would have lower wages regardless of a career break. The administrative data for these analyses did not allow to control for possible selection-effects in depth (e.g. there was no information on educational level, job ambition, psychological variables,…). We did, however, include the income level of 1998, as a proxy for a possible lower attachment to the labor market before the break. The found wage differences are nevertheless significantly large, especially for men.

The policy implications are important. We do not want to conclude anything on the labor market attachment of people taking a career break. The data do not allow us to do so. Even though we tried to control for selectivity, a mere control for income in 1998 does not fully prove this hypothesis. On the other hand, we do find (again) a wage penalty for men after a career break (Frans, Mortelmans, 2009). Even though we do find the gender gap in our analyses, when it concerns career interruptions the consequences show a surprising consistent gap for men who interrupt their career. These effects are only valid for the men below 50 because we did not include cases where the formula is used as an early exit strategy. In that case, the social acceptance might be much higher (i.e; a cost reduction for the company). But early or mid-career men are clearly punished for leaving their job temporarily.

Aside of these wage analyses, we want to stress the other potential effects of career breaks. As we showed on the PSBH panel data, interrupting ones career can also have beneficial effects on one's health. Stepping out the rat race might also have beneficial effects even though wages are affected in a negative way. These effects cannot be tested with this register data but we should not forget them in the larger picture when evaluating the results from this study. ON the other hand, even though other effects may be beneficial, the perceived negative signal of leaving ones job might also have consequences further in the career. We could only test the effect for some years after the break. We did not test the effects on job mobility and long term effects of interruptions. Negative wage effects on the short term may as well have worse long term effects in terms of career success and subjective well-being in the job if the catch-up effect appears to be non-existent. Especially for weaker groups on the labor market, this should be taken into account when promoting long leaves from the labor market.

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Appendix: overview of available data points over time

Table 12 gives an overview of the missing values for income per quarter for people with and without career break, separately for men and women. Since there are more women in the dataset, it is obvious we have more income points for women. In the last year (2006), there are significantly less valid values for the group of interrupters, but also less missings. This is because the number of time points is not equal for this group. Only if the career break stopped in the first quarter in 2003, we can follow these persons until the last quarter of 2006.

Table 12: Missing values for income per quarter, starting point is 2003 (time equals zero)

	With career break				Without career break			
TIME	**men**		**women**		**men**		**women**	
	valid	missing	valid	missing	valid	missing	valid	missing
2003_1	915	395	3 263	794	1 966	624	4 565	1 104
2003_2	642	668	2 958	1 099	1 956	634	4 571	1 098
2003_3	626	684	2 918	1 139	1 952	638	4 562	1 107
2003_4	616	694	2 894	1 163	1 963	627	4 588	1 081
2004_1	595	715	2 881	1 176	1 942	648	4 524	1 145
2004_2	531	779	2 840	1 217	1 908	682	4 500	1 169
2004_3	528	782	2 838	1 219	1 886	704	4 417	1 252
2004_4	521	789	2 828	1 229	1 873	717	4 439	1 230
2005_1	516	794	2 820	1 237	1 858	732	4 382	1 287
2005_2	514	796	2 819	1 238	1 841	749	4 353	1 316
2005_3	516	794	2 809	1 248	1 808	782	4 311	1 358
2005_4	515	795	2 810	1 247	1 797	793	4 353	1 316
2006_1	499	811	2 807	1 250	1 770	820	4 316	1 353
2006_2	349	635	2 206	991	1 751	839	4 305	1 364
2006_3	195	422	1 265	664	1 722	868	4 275	1 394
2006_4	123	204	749	362	1 715	875	4 308	1 361