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## Discovering and Explaining Patterns of Work-Family Reconciliation in Luxembourg.

### Analysis of Administrative Records.

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#### 1 Introduction

This abstract presents an analysis of administrative records from Luxembourg whereby the work-family trajectories of parents are re-constructed and analyzed using tools from state sequence analysis (see Abbott 1990; Abbott and Tsay 2000; Aisenbrey and Fasang 2010; Gauthier et al. 2014) and a clustering algorithm is applied to search for typical patterns. In the final step available co-variates are linked to cluster membership via a multinomial logit model.

From a theoretical point of view, this analysis draws on the life-course perspective (Elder and Giele 2009). In short, the life-course perspective recognizes that life courses are: longitudinal; emerging as a result of continuous interaction between individuals and the social structure; influenced by the historical and geographical context; affected by the timing of events; interconnected with the life courses of others. As outlined in McDaniel and Bernard (2011) and Bernard (2007) the life course perspective can guide academic research and the dialogue between policy makers and academics and provide new insights for policy making. Recognizing that human lives are more than the consecutive events that take place in each life trajectory, the life course perspective can guide the design of comprehensive provisions to build and preserve social, health and human capital through all life stages.

Administrative records for the analysis have been provided by the *Inspection générale de la sécurité sociale (IGSS)* in an anonymous form. The data set covers over 10 000 persons and the substantial time span of eight years. The administrative records describe actual behaviour of individuals, which is of particular

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relevance for the analysis of leave policies as survey respondents have been shown to not always accurately report their parental leave status (Chan et al. 2012).

Luxembourg is a small country located in the heart of Western Europe, characterized by a very high GDP per capita, high employment rate and a high share of international labour migrants. Although findings from Luxembourg could not directly generalize to larger European countries, the size and the composition of the workforce make it comparable to many European regions, especially around large cities (Brosius and Ray 2012). The high proportion of foreign in-commuters particularly resembles that of regions with a dynamic economy located close to international borders, such as, for example, Geneva, Ticino and Basel in Switzerland (OECD 2011, see).

At the descriptive level, the collective analysis of the career trajectories of working parents shows that women tend to reduce their labour market participation after having a child. Taking parental leave full-time could result in both a transition back to employment or into withdrawing from the labour market, while part-time parental leave seems to be part of an overall strategy to reduce working hours after having a child. Interestingly the trajectories of mothers who took leave and who did not take it, did not seem to differ systematically before the event of the birth of the child. However, the trajectories of fathers who take parental leave and who did not were different even before the child is born. This suggests that use of parental leave of mothers can be seen more as reaction to the event of birth, while for fathers it may be related to a longer-term lifestyle preference.

To move the analysis to the analytical level, first a distance matrix has been computed. Next, a clustering algorithm has been applied to search for typical patterns. Finally, co-variables have been linked to cluster membership using a multinomial logit model.

The distance matrix has been computed using the Longest Common Subsequence (LCS). Elzinga (2007) (in Gabadinho et al. 2011, p.28) shows that using LCS is equivalent to using OM with constant indel costs (1) and substitution costs (2). LCS was chosen because it is more sensitive to duration than to sequencing. From a social security point of view it is most important to identify long-term trends, such as long-term transition to part-time hours of work or long spells outside the labour market. It is important to note that using the LCS method is based on a constant substitution and indel cost. In other words, the cost of substitutions between any two states is the same. Similarly, inserting a state has the same cost regardless of what states it is inserted next to. This implies an assumption that all states are equally different from each other.

For this study it was considered appropriate to use a hierarchical clustering procedure and not a partitional one because there was not enough prior knowledge or guidelines, which could have been used to pre-suppose the number of clusters. Another reason to choose a hierarchical procedure was that it has become somewhat of a standard in the sequence analysis literature. More specifically, agglomerative hierarchical clustering with Ward's method has been very frequently applied in previous literature, although it is acknowledged that this choice is mostly a result of convention Martin et al. (2008, p.186).

In order to choose the appropriate number of clusters, the cluster diagnostic tools proposed by Studer (2013) have been applied. He suggests using a number of measures of cluster quality available in the literature, which together can provide

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some indications as to where to stop the clustering. These measures could also be used to compare the results obtained through different clustering algorithms<sup>1</sup>.

The cluster analysis was initially performed under the assumption that the trajectories of mothers and fathers are entirely different from each other. Accordingly, the clustering was performed separately for both samples. A qualitative comparison of the obtained clusters, however, revealed that there are actually more similarities than differences in the trajectory types. The distribution of number of parents in each type is different (women, for example, were overrepresented in clusters dominated by part-time work). The types of clusters however, were not as different as expected. Therefore the analysis was performed again on the pooled sample of both types of trajectories. This has made it possible to compare directly the numbers of men and women in the same cluster.

The results of clustering algorithm applied in this analysis identified nine distinct groups of parents, summarized in Table 1. The gender difference became apparent in the varying male to female ratios in each cluster. The majority of the male trajectories were classified in the career types described by continuous full-time or overtime employment both before and after the birth. In comparison only about one third of the women's trajectories were classified in such clusters. A large fraction (about one third) of the mothers were classified in the trajectory types where the event of the birth marks a clear turn in the trajectory compared to the pre-birth period marked either by a reduction in the working hours or a withdrawal from the labour market. In addition, a large proportion (over 20 per cent) of the female trajectories were classified in clusters characterized by continuous part time employment.

The results from the analysis of the sample of mothers lend partial evidence to an economic justification of women's career decisions. Lower opportunity cost (in terms of foregone salary earnings) does seem to be associated with higher probability to leave the workforce. More children and the presence of a spouse in the household also make it more likely that a woman will leave her pre-birth employment than maintain a continuous full-time career track. However, these factors do not seem to be associated with a higher probability for women to reduce employment hours from full time to part time after having a child.

The results of the same analysis on the male sample provide further insight into the gendered nature of the relationship between employment and family. For both men and women higher levels of earnings and positive salary growth in the previous months are associated with higher odds of being in the cluster characterized by continuous full-time employment. Similarly to married women, married men are more likely to be in employment types characterized by less-than-full-time employment relative to having continuous full-time trajectories. However, in contrast to the results for women, the results for men suggest that presence of other children in the household does not seem to be associated with higher odds of being classified into one of the career types with reduced labour market participation.

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<sup>1</sup> The diagnostic tools are available in the *WeightedCluster* (Studer 2013) package, which runs under the free statistical and programming environment R (R Core Team 2015).

4 Nevena Zhelyazkova, Gilbert Ritschard

Women		Men	
Count	Per Cent	Count	Per Cent
<i>(1) Continuous part-time careers (20 - 39 hrs/week)</i>			
838	19 %	185	3 %
<i>(2) Continuous self-employment</i>			
142	3 %	302	5 %
<i>(3) Continuous full-time careers</i>			
675	15 %	1924	33 %
<i>(4) Continuous overtime hours intermittent with part-time hours</i>			
477	11 %	2408	41 %
<i>(5) Transition to labour market inactivity after birth in 2003</i>			
523	12 %	22	< 1 %
<i>(6) Reduction of working hours after birth in 2003</i>			
682	15 %	39	1 %
<i>(7) Continuous part-time careers (&lt;=20 hrs/week)</i>			
307	7 %	63	1 %
<i>(8) Continuous full-time careers with some irregular hours</i>			
439	10 %	662	11 %
<i>(9) (Possibly) leaving Luxembourg after birth in 2003</i>			
398	9 %	222	4 %
<i>Total</i>			
4481	100 %	5827	100 %

Table 1: Cluster sizes for men and women.

Notes: Counts and percentage correspond to the results obtained through clustering of the pooled data set.

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