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The dynamics of perceived financial difficulties^{*}

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Abstract: The perceptions of individuals regarding their own economic situation are sometimes used to measure individuals' welfare or standard of living, thereby complementing the conventional income-based approach. While the importance of using longitudinal data when analysing the determinants of perceptions has recently been emphasized, the question of state dependence – the extent to which the past affects the present – has rarely been accounted for in the subjective economic well-being literature. The main contribution of the current paper is precisely to investigate the issue of state dependence in perceived financial difficulties. The application of an endogenous switching Markov model to data from the Luxembourg socioeconomic panel 'Liewen zu Lëtzebuerg' for the period 2003-2009 leads to the conclusion that there is a sizeable proportion of genuine state dependence, which confirms the importance of appropriately taking into account dynamic issues when modelling subjective variables. The paper also analyses the determinants of the dynamics of perceived financial difficulties in Luxembourg and compares the results with those obtained when applying the same model to the traditional income poverty approach. Differences are found in the socio-economic correlates affecting persistence in perceived difficulties and persistence in low income, which suggests that perceptions capture dimensions of disadvantage not covered by low income.

Keywords: Perception dynamics, inertia, state dependence, Markov transition models, attrition, initial conditions, Luxembourg

JEL: D31, D60, I32

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1. Introduction

The perceptions of individuals regarding their own economic situation are sometimes used to measure individuals' welfare or standard of living (Kahneman *et al*, 1999). This can be explained partly by discontent with the conventional income-based approach to well-being measurement, and partly by a genuine interest towards alternative approaches (Devicienti and Gualtieri, 2007). Discontent about the income-based approach arises from the fact that income is subject to measurement error and excludes important non-market goods such as public health or educational services. In addition, the definition of relevant equivalence scales to compare households of different sizes and compositions and when focusing on the lower part of the distribution of appropriate poverty lines are challenging issues (Ravallion, 1996). On more substantive grounds, Bourguignon (2006:85) argues that the presence of a redistribution system in many developed countries was successful in reducing the level of poverty (among the ordinary population), but not in eradicating the "feeling" of poverty, which is "often reported among the beneficiaries of minimum income guarantee programs". Hence, income transfers to the poor can potentially fail to eliminate the feeling of social exclusion, suggesting that the concept of poverty or welfare is certainly broader than that of low income.² These elements probably explain why relying on the subjective evaluation of individuals regarding their own situation has been proposed as a valid alternative, or at least complement, to the income-based analysis of the distribution of welfare (Deaton, 2010).

Different ways of relying on subjective information to assess an individual's well-being or poverty have been used in literature. While some papers use this information to calibrate the determination of an income poverty line (Ravallion, 2012), the approach used here consists in directly using individuals' perceptions about their economic welfare as the relevant metric.³

² Moreover, as emphasized by Bourguignon (2006:77), "to some extent, income transfers may even worsen the situation as they may stigmatize their beneficiaries. [...] Reducing poverty is certainly desirable but it may fail to eliminate a feeling of social deprivation that may be rooted in deeper causes".

³ The approach consisting in making use of subjective information to calibrate the determination of income poverty lines relies on the responses to a question asking households how much money they need in order to make ends meet – the so-called Minimum Income Question (MIQ) (see e.g. de Vos and Garner, 1991). Regression based methods are used to derive a social subjective income poverty line based on the relationship between respondents' reported minimum income, actual income and other covariates such as family size. Strictly speaking, this approach may not be seen as a purely subjective approach since a person will be

An individual's self-assessed ability to make ends meet is used as a proxy of his/her economic well-being. Henceforth, the attention in this paper is directed to the topic of financial subjective well-being rather than to the broader concepts of life satisfaction or happiness (van Praag *et al*, 2003).⁴

The importance of using longitudinal data when analysing the determinants of perceptions has recently been emphasized. The two main advantages mentioned by Pudney (2008) are: (i) the possibility to account for time-invariant unobserved heterogeneity; (ii) the possibility to account for the dynamic process through which perceptions respond to changes in circumstances (see also Bottan and Perez Truglia, 2011). This last point, called inertia by Pudney (2008), is related to the concept of state dependence that refers to a within-individual empirical regularity whereby experiencing an outcome in the past increases the probability of experiencing that outcome in the present (Heckman, 2001 or Skrondal and Rabe-Hesketh, 2014). The two main competing explanations of this dependence, individual heterogeneity and behavioural effect from the past to the present, can be usefully illustrated through the example of state dependence in low income. On one hand, individuals that were poor in the past might possess adverse characteristics (such as low ability or human capital endowment) that will increase their probability of being poor in the present. In this case, state dependence is said to be spurious since it is due to the persistence of those adverse characteristics rather than to the previous experience of poverty. On the other hand, experiencing low income in the past may increase *per se* the risk of experiencing low income in the present. In this case, state dependence is said to be genuine since the experience of poverty has a behavioural impact: an individual having experienced the event in the past will behave differently compared to an identical individual not having experienced the event in the past.⁵

In the case of perceptions, state dependence can also be spurious or genuine. In addition, it can also be a reflection of the time necessary for perceptions to adjust to changes in circumstances (Pudney, 2008). Assuming that the current perception depends on the previous

considered poor or not, independently of her own view. This is why this approach is not the direct scope of this paper, which is mainly interested in the perceptions of individuals.

⁴ See Rojas (2006) for a study of the link between overall life satisfaction and satisfaction in domains of life.

⁵In the case of income poverty, Biewen (2009) proposes several mechanisms to explain such a genuine effect such as adverse incentives in countries with a minimum-income guarantee, demoralization or depreciation of human capital, potential health, drug or alcohol problems, bad networking or household split.

perception and on the change in circumstances, two extreme cases can be described. Full state dependence or full inertia (no adjustment) occurs if the current perception is completely determined by the previous perception and not by a change in circumstances. Only long term circumstances (or beliefs) matter and perceptions do not adjust to a change in circumstances (Wunder, 2012). If this is the case, doubts are cast on the fact that perceptions correctly reflect current well-being. Modelling state dependence in perceptions then becomes crucial to avoid the potential bias that estimating a static model would yield. By contrast, no state dependence or inertia (full adjustment) means that current perceptions are not affected by previous perceptions, and changes in perceptions can be fully ascribed to changes in circumstances rather than to long term circumstances; perceptions can then be considered a good indicator of current well-being, and static models are not biased. In between these two extreme cases, complete inertia and full adjustment, any number of combinations can be found and determining which situation holds is ultimately an empirical question.

Despite its importance, the issue of state dependence in variables measuring subjective economic well-being has rarely been accounted for – Newman *et al* (2008) or Kaya (2013) being exceptions.⁶ These authors used (ordered or binary) dynamic models based on a consistent estimation of the current perception as a function of the previous perception. Within this approach, which requires careful modelling of the initial conditions (see Wooldridge, 2005), a formal test of absence of true state dependence consists in assessing whether the regression coefficient of the lagged variable is equal to zero. The main result found by both studies is that there is state dependence in perceptions of financial difficulties, indicating that perceptions of current financial inadequacy require time to fully adjust to changing circumstances. However, no account has been made within these papers for possible non-random attrition.⁷ In the current paper, an alternative strategy proposed by Cappellari and Jenkins (2004) is used to assess the extent of state dependence while simultaneously explicitly modelling the possibility of non-random attrition. To our knowledge, the latter issue has not yet been studied in the context of perceptions dynamics. In addition, the methodology used here also allows the lack of independence between the initial

⁶ Botton and Pérez-Truglia (2011) analyse happiness while Wunder (2012) focuses on life satisfaction.

⁷ Newman *et al* (2008) analysed this question by adding to their unbalanced panel some attrition variables and found that attrition does not seem to be related to financial satisfaction. However, they do not provide a formal test.

status and individual specific unobserved factor (the initial conditions problem) to be taken into account.

Debates about the validity of subjective approaches to well-being or poverty are still ongoing (Ravallion and Lokshin, 2002). However, it can be argued that this approach brings forth valuable information that can be relevant in a rich country, as it is likely to capture the feeling of social exclusion referred to by Bourguignon (2006). In that respect, analysing the perceptions of financial difficulties in Luxembourg, a rich country with a high living standard, is likely to be of interest. Luxembourg displays a level of relative income poverty that is slightly below the EU27 average and a low level of material deprivation by international standards (Fusco *et al*, 2010, 2014). From a longitudinal perspective, Fusco and Islam (2012) analysed the drivers of low income transitions in Luxembourg. Their main results show that there is a high proportion of genuine state dependence in low income and that employment protects from both remaining in low income and entering poverty. The current paper provides insight into the dynamics of the subjective assessment of their financial conditions by Luxemburgers, which can usefully complement the traditional approaches of poverty.

The aim of this paper is to analyse the determinants of perceptions of financial difficulties dynamics in Luxembourg, focusing on the question of state dependence. The contribution of this paper is fourfold. First, further evidence about state dependence on subjective perceptions is provided. Second, potential endogeneity to subjective perceptions transitions due to non random attrition is brought into account. Third, this study is the first attempt to model subjective perception dynamics in Luxembourg, a country with a high living standard. Fourth, the results will be compared with those obtained by Fusco and Islam (2012) who applied the same model to low income transitions. In order to do so, the endogenous switching Markov model proposed by Cappellari and Jenkins (2004) is applied to the data from the Luxembourg socioeconomic panel ‘Liewen zu Lëtzebuerg’ (PSELL3) for the years 2003 to 2009. The paper is organised as follows. Section 2 presents the data while Section 3 presents the methodology used and Section 4 the results. Finally, Section 5 concludes.

2. Data

The main source available to analyse poverty in Luxembourg is the *Socio-Economic Panel ‘Liewen zu Lëtzebuerg’* (PSELL3), which is the Luxembourgish component of the European Union-*Statistics on Income and Living Conditions* (EU-SILC). PSELL3 was launched in

2003, with an initial sample of around 3500 households and around 10000 individuals that were representative of the population living in private households. Interviewed people provide information about their incomes, living conditions and other personal and household characteristics. PSELL3 provides repeated annual observations on the same individuals that allow changes in perceived financial difficulties to be linked with changes in household circumstances. The seven waves of the data covering the years 2003 to 2009 are used.

Every year, the following question is asked: “A household may have different sources of income and more than one household member may contribute to it. Thinking of your household's total income, is your household able to make ends meet, namely, to pay for its usual necessary expenses: 1. With great difficulty, 2. With difficulty; 3. With some difficulty; 4. Fairly easily; 5. Easily; 6. Very easily”. It is assumed that each household has the same interpretation of each modality.⁸ The distribution of this variable per year can be found in Table A1 in annex (see also STATEC, 2013).

Previous studies analysing this question in Luxembourg showed that perceived financial difficulties is higher among households with children than among households without children - and the feeling of financial difficulties increases with the number of children (Reinstadler, 2012). Younger heads of households report more difficulties in making ends meet than older ones. Tenants are confronted with more difficulty than owners. Finally, less educated or unemployed heads of households also report more difficulties to make ends meet (see also STATEC, 2011).

Two choices have been made in view of making the comparison with low income dynamics feasible. First the ordinal outcome variable was dichotomized and those who report having 'difficulties' or 'great difficulties' in making ends meet were considered as being in perceived financial difficulties. Second, the answer to this household level question was attributed to each of the household members (see Taylor, 2011). The proportion of individuals living in households reporting difficulties to make ends meet in Luxembourg varied between 6% and

⁸ Other authors such as Lollivier and Verger (1997) (for European countries) or Misangumukini (2013) (in Mali) combine this variable with other items aiming at uncovering aspects of financial difficulties to build a composite score and identify individuals in situation of subjective poverty. Note also that Taylor (2011) uses it as a dimension of financial capability.

7% between 2003 and 2009. This is an intermediate value compared to the figures of relative income poverty (between 12% and 15%) and material deprivation (between 2% and 5%).

As a first assessment of the dynamic of this variable, Table 1 reports the transition matrix. The upper panel of Table 1 reports the pooled transition matrix of individuals present in consecutive pairs of waves, $t-1$ and t . The probability of being in perceived financial difficulties at time t is 48.4% for individuals that were already in that situation at $t-1$ whereas it is equal to 3.6% for those who were not in a situation of perceived financial difficulties the previous year. This illustrates that, as for the case of low income, the probability of being in perceived financial difficulties varies greatly (a 45% difference) according to the previous year's perception. This difference is, however, smaller than in the case of low income transition: Fusco and Islam (2012) report a 65% difference between the low income persistence rate (70.6%) and entry rate (4.2%). This suggests that the level of state dependence in perceptions of financial difficulties may be lower than in the case of low income. However, these values are obtained without controlling for observed and unobserved determinants of the initial situation and therefore might be the result of an endogenous selection mechanism if individuals more likely to remain in a situation of perceived financial difficulties are overrepresented among the group of individuals in a similar situation in the previous year.

Table 1. Transitions matrix in perceived financial difficulties (PFD - in %)

t-1	t			total
	Non PFD	PFD	Missing	
<i>individuals with non missing FD status at t (N=44942)</i>				
Non PFD	96.4	3.6		100
PFD	51.6	48.4		100
All	93.6	6.4		100
<i>all individuals (N=53523)</i>				
Non PFD	81	3	16	100
PFD	42.4	39.8	17.8	100
All	78.5	5.3	16.2	100

Source: PSELL3, STATEC and CEPS/INSTEAD, 2003-2009; authors' computation. Sample restricted to individuals with no missing values in the covariates used in the following sections. Sample weights used.

Table 1 also reports the transition matrix of all individuals, that includes those individuals present in $t-1$ but who exited the panel in t , in addition to those present in both $t-1$ and t (see lower panel). It appears that 16% of the individuals not in financial difficulties at time $t-1$ and

17.8% of the individuals in financial difficulties at time $t-1$ exited the panel at time t . This difference is lower than that reported by Fusco and Islam (2012) between the attrition level of initially low income (17.6%) and of initially non low income (14.1%), which suggests that the problem of attrition might be less important for perceptions of financial difficulties dynamics than for low income dynamics. This difference in terms of attrition rates according to the previous year's status illustrates the potential issue of endogeneity of sample retention. If attrition is non random and depends on the perception of financial difficulties, it might affect the estimates of transitions. When analysing the dynamics of perceived financial difficulties, the issue of attrition and state dependence needs to be tackled.

3. Model

In this paper, we apply the methodology proposed by Cappellari and Jenkins (2004), in the context of low income transitions, to the modelling of subjective perception transitions. This first order Markov model of transitions allows for potential endogeneity to transitions due to both initial conditions and attrition to be accounted for. The choice to favour this model compared to the alternative of using nonlinear dynamic random effects models is based on three reasons. First, the papers following nonlinear dynamic random effects models do not usually model attrition. Second, they require a sequence of observations for each individual, starting from the initial wave of the panel leading to the exclusion of individuals temporarily leaving the panel or joining the panel after the first year (Cappellari and Jenkins, 2008). By contrast, the Markovian model proposed by Cappellari and Jenkins (2004) allows attrition to be analysed in a straightforward way. Third, this choice fits our aim of comparing the results obtained with those of Fusco and Islam (2012) on low income transitions.

The model used by Cappellari and Jenkins (2004) is a trivariate probit model where, for $i=1..N$ individuals and $t=1..T$ periods, the three outcomes simultaneously modelled are (1) the latent propensity s_{it-1}^* of being in perceived financial difficulties for individual i at time $t-1$, (2) the latent propensity r_{it}^* of being retained in the sample for individual i between periods $t-1$ and t , and (3) the latent propensity s_{it}^* of being in perceived financial difficulties for individual i at time t . The model can be written as follows.

$$\begin{cases} s_{it-1}^* = \beta' x_{it-1} + u_{it-1} & (1) \\ r_{it}^* = \varphi' w_{it-1} + \mu_{it} & (2) \\ s_{it}^* = [\gamma_1' s_{it-1} + \gamma_2'(1 - s_{it-1})]z_{it-1} + \omega_{it} & (3) \end{cases}$$

x_{it-1} , w_{it-1} and z_{it-1} are vectors of explanatory variables. For model identification, exclusion restrictions, that is variables supposed to impact on the potentially endogenous process of attrition and initial conditions, but not on the main outcome of interest, are required (see Section 4 for details). The joint distribution of the error terms $(u_{it-1}, \mu_{it}, \omega_{it})$ is trivariate normal and each error term $(u_{it-1}, \mu_{it}, \omega_{it})$ is assumed to follow a standard normal distribution and to be the sum of a normal individual-specific unobserved effect $(\eta_i, \psi_i, \varsigma_i)$ and of a normal orthogonal white noise $(v_{it-1}, \lambda_{it}, \tau_{it})$.

The third equation is an equation of conditional current ‘perceived financial difficulties’: each explanatory variable of z_{it-1} can impact differently on current perceived financial difficulties depending on the previous perceived financial difficulties. For an individual previously in perceived financial difficulties ($S_{it-1}=1$), the column vector γ'_1 corresponding to the estimates of the correlates of persistence into perceived financial difficulties applies. For an individual previously not in perceived financial difficulties ($S_{it-1}=0$), the column vector γ'_2 which corresponds to the estimates of the correlates of entry in perceived financial difficulties applies. These two sets of parameters provide a formal test of the absence of genuine state dependence. If the null hypothesis $\gamma_1 = \gamma_2$ cannot be rejected, then the covariates have the same impact on transitions in perceptions, independently of the initial status of perceived financial difficulties. This means that knowing whether someone is in perceived financial difficulties in the previous year does not bring additional information regarding the impact of the explanatory variables. In the context of perceptions, it can be interpreted as a full adjustment of perceptions to change in circumstances (Pudney, 2008).

The tests for endogeneity of initial conditions and retention proposed by Cappellari and Jenkins (2004) are based on the three unconstrained cross-equation correlation coefficients that constitute the fourth part of the model. Let ρ_1 , ρ_2 and ρ_3 refer to the correlation between the unobserved individual factors respectively affecting 1. sample retention and initial perceived financial difficulties, 2. initial perceived financial difficulties and conditional current perceived financial difficulties and 3. conditional current perceived financial difficulties and sample retention. A positive (negative) cross-equation correlation means that individuals more likely to experience one outcome are also more (less) likely to experience the other. The following tests of exogeneity can be made. If the null hypothesis $\rho_1 = \rho_3 = 0$ cannot be rejected, then the sample retention process is exogenous and it is not necessary to model attrition in order to have unbiased estimates. Regarding initial conditions, the same

reasoning applies when testing the hypothesis $\rho_1 = \rho_2 = 0$. Finally, if the null hypothesis $\rho_1 = \rho_2 = \rho_3 = 0$ is not rejected, then a probit model can be applied to each process separately.

After estimation of the model by simulated maximum likelihood, transition probabilities can be derived (see Cappellari and Jenkins, 2004). Cappellari and Jenkins propose measures of aggregate state dependence (ASD) and genuine state dependence (GSD). Aggregate state dependence is the difference between the aggregate persistence rate and the aggregate entry rate:

$$ASD = \left(\frac{\sum_{i \in \{S_{it-1}=1\}} Pr(S_{it}=1|S_{it-1}=1)}{\sum_i S_{it-1}} \right) - \left(\frac{\sum_{i \in \{S_{it-1}=0\}} Pr(S_{it}=1|S_{it-1}=0)}{\sum_i (1-S_{it-1})} \right) \quad (4)$$

ASD does not allow differentiating between state dependence resulting from individual heterogeneity and genuine state dependence. The measure of genuine state dependence proposed by Cappellari and Jenkins (2004) allows the proportion of aggregate state dependence that is non spurious to be estimated, given the fact that individual heterogeneity (observed or unobserved) is controlled for. It consists of the average of the individual difference between the predicted probability of poverty permanence and poverty entry, which allows us to difference out the individual unobserved effects:

$$GSD = \frac{1}{N} \sum_{i=1}^N [Pr(S_{it} = 1|S_{it-1} = 1) - Pr(S_{it} = 1|S_{it-1} = 0)] \quad (5)$$

4. Results

The unit of analysis is the individual and the covariates reflect the demographic and working characteristics of the household an individual lives in. The covariates refer to the individual (age, age squared and gender), the head of the household (citizenship, employment status, health status, marital status, education, age, age squared and gender) and the household (household composition, attachment to the labour market, tenure status) and are measured at the beginning of each potential transition. It is hypothesized that variables suggesting additional financial resources (e.g. an additional working individual) decrease the risk of entering/remaining in perceived financial difficulties through a risk diversification effect, while variables reflecting additional expenditures (henceforth increasing the (perception of) resources needed), such as an additional child, increase the risk of entering/remaining in

perceived financial difficulties.⁹ It is important to note that since one of this study's aims is to compare the determinants of the perception of financial difficulties dynamics with those of income poverty dynamics, we do not control for (absolute or relative) income, even though this variable is usually found to be an important predictor of perceived income adequacy (Newman et al, 2008). The working sample is an unbalanced panel of 15481 individuals from 5259 original households providing 53523 person-wave observations. Table A2 provides the mean value of the covariates for the whole population and by status of perceived financial difficulties.

As previously mentioned, a set of exclusion restrictions is needed for model identification. For sample retention, a dummy variable indicating whether the interviewer has changed between $t-2$ and $t-1$ is used. A change in interviewer is expected to reduce the probability of staying in the sample and not to impact on perception transitions. For initial conditions, a dummy variable is used to indicate whether the head of the household's father was in a highly skilled job when the head of the household was between 12 and 16 years old. Individuals in this case are expected to have a lower likelihood of initially being in perceived financial difficulties than their counterparts and this should not affect current perception transition.¹⁰

Table 2 presents the estimates of correlations between unobserved factors and the test of exogeneity of the two selection process. The null hypothesis of the Wald tests of exogeneity of initial conditions ($\rho_1 = \rho_2 = 0$), of exogeneity of income retention ($\rho_1 = \rho_3 = 0$) and of the joint test of the three correlations ($\rho_1 = \rho_2 = \rho_3 = 0$) could not be rejected. This suggests that income retention and initial conditions are exogenous processes: not modelling initial conditions and attrition will not have yielded biased estimates. By contrast, these processes were found to be endogenous to low income transitions (Fusco and Islam, 2012).

⁹ Robust standard errors of the estimates are computed to account for the fact that there are repeated observations within each household, but also that there are repeated observations for individuals across time.

¹⁰ Note that these two exclusion restrictions are the same as those used by Fusco and Islam (2012) when analysing low income transitions. They were considered valid after testing that they indeed had an impact on the process they were referring to and not on the transition equation (see Table 2).

Table 2. Estimates of model correlations and tests

Correlation coefficients between unobservables affecting:		p-value
Initial FD and retention (ρ_1)	-0.0263	0.517
Initial FD and conditional current FD (ρ_2)	-0.0861	0.737
Retention and conditional current FD (ρ_3)	0.1802	0.662
Test for exogeneity of initial condition and retention		
Initial poverty: H0: $\rho_1 = \rho_2=0$	0.48	0.785
Retention: H0: $\rho_1=\rho_3=0$	0.48	0.786
$\rho_1 = \rho_2 = \rho_3=0$	0.5	0.918
Test for exclusion restriction		
effect of hoh's father's job on initial FD	4.32 *	0.038
effect of change of interviewer on retention	6.56 *	0.010
effect of hoh's father's job on transition	0.33	0.847
effect of change of interviewer on transition	3.33	0.189
effect of hoh's father's job and change of interviewer on transition	5.9	0.207
State dependence		
Absence of state dependence. Ho: $\gamma_1 = \gamma_2$	100.08 ***	0.000
Aggregate state dependence	0.46	
Genuine state dependence	0.26	

Source: PSELL3, STATEC and CEPS/INSTEAD, 2003-2009; authors' computation. Sample restricted to individuals with no missing values in the covariates. hoh: head of the household. * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$, sample weights used.

Table 2 also displays the statistics relative to aggregate and genuine state dependence. The formal test for the absence of genuine state dependence led to the rejection of the null hypothesis of the absence of genuine state dependence ($p < 0.0001$). This implies that the covariates have a different impact on the current status of perceived financial difficulties conditional on the previous year status. After estimating the current model, aggregate state dependence was found to be equal to 0.46 and genuine state dependence to 0.26. GSD is equal to 57% of ASD. Hence, more than half of aggregate state dependence is accounted for by genuine state dependence; however, the part of state dependence attributable to heterogeneity is non negligible. This result suggests that perceptions do not immediately adjust to circumstances which emphasize the importance of appropriately taking this into account when modelling subjective perceptions. Finally, it should be noted that the level of ASD found in low income transitions was higher (0.65), but the proportion of ASD accounted for by GSD was of a similar level (60%).

Table 3 reports the estimates of the conditional current status of perceived financial difficulties (Table A3 in the annex contains the estimates of the other equations). Column (2) displays the estimates of persistence (γ_1) and column (4) the estimates of entry (γ_2). In the case of the persistence equation, few coefficients are found to be statistically significant. At the household level, an additional working individual in the household strongly decreases the risk of staying poor. The importance of the presence of secondary earners to avoid income poverty has been stressed in literature (Jenkins, 2011) and it turns out to also be the case for perceptions. The labour market status of the main income earner is also a determinant of permanence into perceived financial difficulties. The probability of remaining in financial difficulties increases when the head of the household is unemployed, but decreases when they are self employed. This last result may suggest that the self-employed are more used to coping with financial difficulties and having unstable earnings. The human capital of the household head also plays a role since the risk of remaining in perceived financial difficulties increases when the head of the household has a low level of education. Finally, the demographic characteristics of the household are important: the probability of remaining in perceived financial difficulties increases when there is an additional child aged between 6 and 11 or between 12 and 17. This may reflect the fact that the presence of older children raises (the perceptions for) the need for financial resources. In the case of low income, Fusco and Islam (2012) also found that few covariates impacted on the risk of remaining in low income, but with the exception of the effect of an additional individual at work, the results were quite different. The difference in socio-economic correlates affecting persistence in perceived and objective financial difficulties suggests that both concepts capture different dimensions of disadvantage.

Table 3. Estimates of conditional current status of perceived financial difficulties

	S at t			
	S at t-1		Non S at t-1	
	Coef.	t	Coef.	t
individual characteristics				
Female	0.00111	(0.02)	-0.0451	(-1.48)
Age	-0.00356	(-0.81)	0.00509	(1.64)
age squared	0.0000672	(0.76)	-0.000103	(-1.72)
head of household characteristics				
Female	0.166	(0.82)	0.190*	(2.27)
Age	0.0572	(1.62)	-0.0108	(-0.48)
age squared	-0.000503	(-1.39)	0.000199	(0.78)
bad or very bad health	0.0235	(0.12)	0.360**	(2.66)
Portuguese	0.154	(0.81)	0.303**	(2.73)
other EU15	0.180	(0.93)	0.0445	(0.40)
non EU15	0.00940	(0.03)	0.589**	(2.60)
Single	0.305	(1.34)	0.282**	(2.74)
divorced	0.109	(0.51)	0.103	(1.05)
widow	0.0169	(0.06)	-0.239	(-1.63)
lower education	0.691*	(2.44)	0.587***	(4.65)
secondary education	0.396	(1.57)	0.445***	(3.96)
part time	-0.553	(-0.99)	0.779**	(3.14)
Unemployed	0.516*	(2.11)	0.409*	(2.14)
self employed	-1.429***	(-4.27)	0.0363	(0.26)
Retired	-0.271	(-0.81)	-0.317	(-1.68)
Other	0.0372	(0.17)	0.304*	(2.36)
household characteristics				
number of children less than 6	0.167	(1.36)	0.200**	(3.12)
number of children less between 6 and 11	0.256*	(2.36)	0.000302	(0.00)
number of children less between 12 and 17	0.379***	(3.53)	0.0959	(1.38)
number of adults	0.134	(1.27)	0.0607	(1.20)
number of individuals at work except hoh	-0.321*	(-2.31)	0.00856	(0.13)
lone parents	0.107	(0.43)	0.312*	(2.01)
acceding to property	-0.0515	(-0.18)	0.274*	(2.10)
tenant or rent free	0.0850	(0.27)	0.479**	(3.20)
wave 2	-0.251	(-1.04)	0.156	(1.31)
wave 3	-0.127	(-0.51)	0.0389	(0.34)
wave 4	0.172	(0.70)	0.104	(0.89)
wave 5	0.202	(0.87)	0.181	(1.46)
wave 6	0.0359	(0.18)	0.155	(1.38)
Constant	-2.733*	(-2.00)	-3.101***	(-6.02)
N	53523			
log likelihood	-41743.3			

Source: PSELL3, STATEC and CEPS/INSTEAD, 2003-2009; authors' computation. Sample weight used. The reference person is a man living in a household whose head is a Luxembourgish well-educated married man, working full time and who owns his accommodation. * p<0.05 ** p<0.01 *** p<0.001

More covariate coefficients are found to have a statistically significant impact on the risk of entering into a situation of perceived financial difficulties, which seems to indicate that there is more heterogeneity in poverty entry than permanence. As for persistence into financial difficulties labour market characteristics and the human capital of the head of the households are important determinants of entry into financial difficulties. High educational attainment of the head of the household protects from falling into financial difficulties. The household's head's status in the labour market is also a strong determinant of entering financial difficulties: households where the head is unemployed or a part time worker are at a higher risk of entering into perceived financial difficulties compared to when the head is a full-time worker. The same effects, but stronger in magnitude, were found for low income. Differences in household composition is correlated with the likelihood of entering into perceived financial difficulties: if the household head is single the risk of entering financial difficulties is higher than when the household head is married which can be interpreted as a risk diversification effect: diversification of income sources or of individuals in the household reduce the risk of entering into financial difficulties. An additional child aged less than 6 increases the probability of entering into financial difficulty whereas the coefficient related to the number of children aged between 6 and 11 or between 12 and 17 is not significant. Hence, the presence of older children increases the risk of *persistence* in perceived financial difficulties, while the presence of young children increases the risk of *entering* such a situation. Being a tenant or acceding to property increases the risk of entering financial difficulties, which can be seen as a diversification effect since being an outright owner can be an element of financial security.

There is more similarity here between the covariates significantly affecting entry in subjective and objective poverty. The main differences are that while an additional working individual (living in a household where the head is self-employed) decreases (increases) the risk of entering into low income, it does not affect entry into perceived financial difficulties. In addition, living in a lone parent family increases the risk of entering financial difficulties while it (surprisingly) does not affect entry into low income.

5. Conclusion

The aim of this paper was to provide an analysis of the drivers of perceptions of financial difficulties transitions in Luxembourg, accounting for potential endogeneity due to initial conditions or non random attrition. Contrary to what Fusco and Islam (2012) found in the

case of low income dynamics, both processes were found to be exogenous to perceptions. A significant proportion of aggregate state dependence was found, around 46%. But this proportion was lower than that found for low income (65%). Genuine state dependence accounts for 57% of aggregate state dependence – a proportion similar to that found for low income. Hence, more than half of aggregate state dependence is accounted for by genuine state dependence; however, the part of state dependence attributable to (un)observed heterogeneity is non negligible. This result suggests that perceived financial difficulties do not immediately adjust to change in circumstances. Henceforth, the main lesson of this paper is that state dependence, or inertia, should appropriately be taken into account when modelling perceptions.

The econometric model highlights individual and household characteristics associated with entry and permanence in a situation of perceived income difficulties. Employment and a good education protect from both remaining in and entering into such a situation. Household composition impacts differently on both processes. The presence of older children increases the risk of persistence in the feeling of having difficulty to make ends meet (but not the risk of entering subjective poverty), while the presence of young children increases the risk of transiting into subjective poverty (but not the risk of persisting in it). Finally, differences were found in the socio-economic correlates affecting persistence in perceived difficulties and persistence in low income, which suggests that the subjective perceptions capture dimensions of disadvantage not covered by low income.

7. References

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Table A1: descriptive statistics

year	very difficult	Difficult	somehow difficult	fairly easily	easily	very easily
2003	1.9	5.2	13.1	29.9	37.6	12.3
2004	1.8	4.8	13.6	28.2	36.4	15.1
2005	1.8	4.4	14.1	27.7	39.6	12.3
2006	1.6	3.8	12.8	31.3	39.0	11.5
2007	1.8	4.8	12.8	30.5	40.1	10.1
2008	1.9	5.4	14.0	30.9	37.8	10.0
2009	2.1	5.7	17.2	31.1	34.3	9.7

Source: PSELL3, STATEC and CEPS/INSTEAD; author's computation.

Table A2: descriptive statistics

	all	non poor	poor
individual characteristics			
female	0.51	0.51	0.51
age	37.72	38.19	30.87
head of household characteristics			
female	0.23	0.22	0.39
age	48.28	48.57	43.98
bad or very bad health	0.07	0.06	0.22
Luxembourg	0.61	0.63	0.31
Portuguese	0.15	0.13	0.37
other EU15	0.20	0.21	0.19
non EU15	0.04	0.03	0.13
married	0.74	0.75	0.62
single	0.11	0.11	0.15
divorced	0.08	0.08	0.17
widow	0.06	0.06	0.06
tertiary education	0.27	0.28	0.06
lower education	0.37	0.35	0.63
secondary education	0.36	0.37	0.31
full time	0.67	0.68	0.64
part time	0.00	0.00	0.01
unemployed	0.02	0.01	0.10
self employed	0.05	0.06	0.02
retired	0.18	0.18	0.06
other	0.08	0.07	0.17
father of household head in skilled job	0.29	0.30	0.13
household characteristics			
number of children less than 6	0.32	0.31	0.51
number of children less between 6 and 11	0.32	0.32	0.38
number of children less between 12 and 17	0.29	0.28	0.45
number of adults	2.28	2.28	2.23
lone parent	0.04	0.03	0.12
number of individuals at work except household head	0.59	0.59	0.57
outright owner	0.31	0.32	0.09
acceding to property	0.44	0.44	0.37
tenant or rent free	0.26	0.24	0.53
change of interviewer	0.11	0.11	0.10

Source: PSELL3, STATEC and CEPS/INSTEAD; author's computation. Based on the 53523 person waves observations with no missing values in the covariates. Sample weights used.

Table A3. Estimates of initial conditions and retention equations

	initial poverty status		retention	
	Coef.	t	Coef.	t
individual characteristics				
female	-0.0399	(-1.22)	0.0349*	(2.26)
age	0.00402	(1.77)	0.000614	(0.44)
age squared	-0.0000833	(-1.90)	0.0000137	(0.55)
main income earner characteristics				
female	0.273**	(3.28)	-0.0158	(-)
age	0.00731	(0.38)	0.0191*	(2.22)
age squared	-0.0000659	(-0.33)	-0.000253**	(-)
bad health	0.507***	(6.29)	-0.155**	(-)
Portuguese	0.433***	(3.75)	0.0846	(1.26)
other EU15	0.177	(1.74)	-0.0446	(-)
non EU15	0.687***	(4.63)	-0.337**	(-)
single	0.255*	(2.20)	0.00739	(0.12)
divorced	0.286**	(2.64)	-0.00870	(-)
widow	-0.136	(-0.72)	-0.0125	(-)
lower education	0.759***	(6.71)	0.0255	(0.49)
secondary education	0.554***	(5.46)	0.0603	(1.24)
part time	0.383	(1.13)	0.220	(0.91)
unemployed	0.723***	(5.01)	0.0817	(0.70)
self employed	0.000259	(0.00)	-0.142*	(-)
retired	-0.0263	(-0.16)	0.0484	(0.77)
other	0.471***	(3.86)	0.0318	(0.49)
household characteristics				
number of children less than 6	0.230***	(3.64)	0.0230	(0.63)
number of children less between 6 and 11	0.0124	(0.20)	-0.0462	(-)
number of children less between 12 and 17	0.195**	(3.08)	-0.0356	(-)
number of adults	0.147**	(2.88)	-0.0616*	(-)
number of individuals at work except hoh	-0.160*	(-2.17)	-0.110***	(-)
Lone parents	0.306*	(2.04)	-0.146	(-)
acceding to property	0.327**	(2.69)	0.00173	(0.03)
tenant or rent free	0.654***	(5.33)	-0.0979	(-)
wave 2	-0.0398	(-0.55)	0.131*	(2.32)
wave 3	-0.0163	(-0.19)	0.258***	(4.42)
wave 4	-0.0593	(-0.67)	0.299***	(5.45)
wave 5	-0.0104	(-0.12)	0.345***	(5.77)
wave 6	0.110	(1.28)	0.189**	(3.26)
exclusion restrictions				
father of household head in skilled job	-0.186*	(-2.07)		
change of interviewer			-0.143*	(-)
constant	-3.474***	(-6.95)	0.704**	(2.99)
N	53523			
log likelihood	-41743.3			

Source: PSELL3, STATEC and CEPS/INSTEAD, 2003-2009; authors' computation. Sample weight used. The reference person is a man living in a household whose head is a Luxembourgish well-educated married man, working full time and who owns his accommodation. * p<0.05 ** p<0.01 *** p<0.001



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