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An economic analysis of the empty nest syndrome: What the leaving child does matters

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An economic analysis of the empty nest syndrome: What the leaving child does matters

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School of Business & Economics
Discussion Paper

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An economic analysis of the empty nest syndrome: What the leaving child does matters

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Abstract

This study is an empirical investigation of the empty nest syndrome, commonly understood as a situation where there are feelings of loss or loneliness for mothers and/or fathers following the departure of the last child from the family home. This investigation makes use of rich, longitudinal, nationally representative German data to assess whether there is evidence for such a syndrome. Furthermore, the analysis considers the role of two key economic variables: consumption and leisure via the standard economic concept of utility maximisation. The analysis highlights a conflict between what economic theory predicts - more disposable income and a gain of leisure time - and the psychological (and cultural) notion of the lonely, sad empty nester. This conflict is an empirical question and here it is resolved via an assessment of the change in life satisfaction that is reported when parents become empty nesters. Importantly, this investigation also tracks what the last child leaving the household goes on to do: The found reduced life satisfaction seems to be wholly moderated if the last child leaves the nest for the purposes of education, but not if for purposes of employment.

JEL Codes
D64, I31

Key Words
Life Satisfaction, Subjective Well-being, Empty Nest Syndrome, Family, Income, Consumption, Leisure

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An economic analysis of the empty nest syndrome: What the leaving child does matters

1. Introduction

The sense of loneliness and loss experienced by many people when their last child leaves home is widely known as the empty nest syndrome (ENS). The phenomenon of a parent or parents who, having raised children for many years, find themselves bereft when the last or only child leaves home are complex and possibly universal (Nuack, 2017). The notion of the ENS was first discussed in relation to families during the 1960s and thereafter it has entered common usage in the English language (Dodd, 2011). It has since been applied loosely to the intense feelings ranging from anxiety to depression experienced by some mothers and/or fathers when grown-up children leave the family home.

Becoming an empty nester may well have profound effects on the lives of such individuals both economically and emotionally. Indeed, this aspect of the parenting life-cycle has been a focus of medical and sociological studies, where the difficulties of this transition from a health and societal perspective have been discussed (Hiedemann et al., 1998). However, this literature often relies on small-scale regional primary data samples, for example an inland mountainous area of China (Liu and Guo 2008), or it is qualitative with a commensurate small sample size (Spence and Lonner 1971). In contrast, this is a large sample investigation of the phenomena taking advantage of thirty-four consecutive years of a nationally representative dataset, the German Socio-Economic Panel (SOEP). The focus is on the change in the subjective well-being of the individuals who become empty nesters. By considering individual life satisfaction, the investigation looks specifically for evidence of the syndrome and investigate issues of economic well-being, namely consumption and leisure. Additionally, the leaving child is tracked to determine whether what the child leaves the home to do has any bearing on parental well-being.

The use of this large, well regarded nationally representative dataset to investigate the empty nest is particularly important given how the outcomes of some of the previous small-scale studies have been used to make general claims regarding ENS. For example, a study investigating whether depression was induced by the last child leaving with a sample of parents who are over sixty years old and from rural Thailand (Abas et al. 2009) has been used to argue, in general terms, that empty nest syndrome is a myth (Alleyne 2009).[1] However, claiming the empty nest syndrome as a falsehood requires more evidence than a single sample or, as in some instances, parts of one study (Borland, 1982). To assert that the empty nest syndrome is a myth without much evidence is particularly disingenuous as it is, in effect, a rejection of the feelings of distress and sadness that many people report, albeit anecdotally. A

[1] The average age of the parents in this study is 69, and one third of the participants are widowed (Abas et al. 2009). Clearly this is not a sample or study that should lead to general claims that the empty nest syndrome is a myth.

clear illustration of this distress is provided by the punk icon Viv Albertine who wrote the following in her memoir: "Since she was born, I've wanted my daughter to have everything I didn't have – a happy, stable family, access to books and art, a good education, a beautiful home – but this quest has become my whole world. I get upset if she's had a bad day at school. *Last week I broke down and cried at the thought of her leaving home when she's eighteen. That's eleven years away.*" (Albertine 2014, p.319, emphasis added.) These feelings, and the word syndrome itself, suggest that becoming an empty nester is a negative experience though large-scale evidence, like that presented here, is required for a more thorough assessment.

From a standard economic analysis point of view, there are reasons to suspect that becoming an empty nester could have positive aspects, potentially increasing utility via allocating more income for parents' consumptions and extra available leisure time. Empirically income is considered directly in two main ways, household income before becoming an empty nester (not to conflate income changes with household size changes) and the OECD measure of equivalised income (which explicitly recognises changes in household size).[2] As section 2 explains, the tracking of what the leaving child does can be considered an indirect consideration of the role of income for consumption possibilities. Household income changes induced by the household becoming an 'empty nest' may have positive or negative impacts on utility. This ambiguity arises, in part, due to the disposable income consequences that are contingent upon what the last child is doing before and after leaving home. If in employment, the financial burden for the new empty nesters could be reduced[3]; if in education, the parent(s)' necessary expenses may even have increased. Clearly there is nuance in what happens to income and whether the empty nesters have more or less consumption opportunities, and therefore more or less utility, than when rearing children. In contrast, a more unambiguous change relates to leisure: parents who now have an empty nest should, on average, have less housework to do and thus more leisure time (or more paid work) which can be used to increase utility. The impact of these consumption and leisure changes are explored in this research, along with a more general assessment of the empty nest syndrome. The predictions from the economic analysis of an increase in utility are in stark contrast from those that would be expected from a psychological point of view, which more widely reflects the common societal perception of the syndrome being rather negative. This tension between economics and psychology is an empirical question and is thus resolvable, and is discussed further, as well as empirically assessed, below.

Section 2 provides a discussion of the academic literature and relevant theory, and contains two subsections: 2.1 is a general discussion, from multiple disciplines, about the syndrome; section 2.2 develops predictions based upon a consideration of related changes for leisure and consumption. Section 3 describes the data and method used. Section 4 presents the results. Section 5 is a concluding discussion.

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[2] The OECD measure weights the individuals for in the household in the following way: 1.0 to the first adult; 0.5 to the second and each subsequent person aged 14 and over; 0.3 to each child aged under 14.

[3] With the caveat that the child may have donated some of her income to her parents.

2. Theory and literature review

This section assesses the nature and scope of the ENS in two distinctive parts. Firstly, a discussion of the relevant literature from multiple disciplines is presented that seeks to explain why an analysis of ENS is a valid area of enquiry. Secondly, an economic analysis is undertaken to consider the utility of empty nesters as a consequence of the changes in consumption and leisure, which result from the change in household situation. These two parts provide differing predictions regarding how a new empty nester will feel about their child leaving the household.

2.1 **A literature survey of the Empty Nest Syndrome**

The empty nest syndrome is symptomatic of feelings and psychological fears ranging from sorrow to depression (Evenson and Simon, 2005), rather than being a formally recognised medical condition. As such it can be assessed by asking people how they feel. Such anxieties, apprehensions and fears are not necessarily irrational and are apparent for parents when the last child leaves their home as the empty nest phenomenon is possibly sociological or biological in origin. In terms of the Social Sciences as a whole, one of the earliest academic studies of the transition to the empty nest was by sociologists. Spence and Lonner (1971) use intensive case studies of 27 white, middle class women and find partial evidence of unhappiness as these women are unprepared for life after children leave home.

In psychology, Raup and Myers (1989, p 181) clarify the definition of ENS as "…a maladaptive response to the post-parental transition, which is stimulated by reactions to loss...". Furthermore, using correlates of ENS over the post-war period, they found qualitative evidence that full-time employed women are less susceptible to ENS and unemployed women are the most at risk. More recently, Mitchell and Lovegreen (2009) use a mixed methodological approach to assess a sub-sample of 316 parents from four ethnic backgrounds and found only a minority of the respondents reported ENS. These studies, and those briefly discussed in the introduction, highlight the pressing need for a large-scale quantitative study to provide more evidence about its existence or non-existence and thereby provide a rationale for this study.

In terms of economics, an assessment of the family dates back to the pioneering work of Gary Becker which, for this investigation's purpose, links childbearing and childrearing to assumptions of market equilibrium and maximising behaviour (Becker, 1981). For Becker, families gain from the specialisation of functional roles in the household. The diminishing economic role of the family presented by Becker presupposes many of the household tasks such as looking after children and food preparation are being performed by the market and in many circumstances even the state. If this is the case, then this outcome could help to explain why the ENS has seemingly become increasingly evident in the past 50 years. As parents have more

time and extra resources for their children, they consequently feel bereft when the last one departs the parental home. This latter point does assume that the purpose of having children in the first place is not an instrumental one, designed to ensure that parents use their own children to look after them in old age. In other words, parents set aside sufficient funds to finance elderly care by the market and/or state.

There is much general discussion of the empty nest phenomenon, but within the economics literature specifically the syndrome has received insufficient attention so far given its potential importance to the life-cycle of the family. Nevertheless, the economic analysis of the household production function is well established (Gronau, 1977) of which the labour supply decision is an integral part covering the trilemma of paid work, household tasks and leisure (Grogan and Koka, 2013). Consequently, the economic dimensions of the empty nest households are becoming more apparent because family utility depends on both consumption and production over the longer term, especially as intergenerational family dynamics change from the traditional unit of two parents plus children to many different variations including single parent households (Lundberg and Pollak, 2007).

Primarily, while there is negligible analysis of the empty nest syndrome within the economics literature, the effect of the change in circumstances on life satisfaction such as becoming unemployed may offer close parallels. In other words, becoming an empty nester could be analogous to entering unemployment, because in both circumstances there is a profound change in the life of the affected person. For example, Winkelmann and Winkelmann (1998), using early waves of the same dataset as used below, famously demonstrated that non-pecuniary factors are far more important in explaining the loss of well-being associated with becoming unemployed than any effects from a reduction in income. Non-pecuniary effects matter, and Winkelmann and Winkelmann consider the loss in well-being from unemployment being related to a loss of self-esteem, the loss of social relationships and the change of identity within society. These reasons put forward for the loss of well-being experienced by a worker becoming unemployed are analogous to any losses experienced by parents when the last child leaves home. As a result, what ENS could be picking-up is another stage in parenting not previously specified. That is, after child-bearing and child-rearing, there then is the neglected final stage that can be captured by the term "child-clearing" as parents deal with the difficulties and complexities of children leaving home.

In terms of this paper, for some parents the process of "child-clearing" or becoming ultimately an empty nester may not be unambiguously sad and there are even non-pecuniary reasons to suggest increased happiness.[4] Also, integral to the situation of a sense of loss might be the notion of pride derived from the satisfaction in a job well done; this job well done might involve children leaving the nest for employment or full-time education. Furthermore, this might be augmented by having more quality leisure time and fewer constraints. Consequently, this may well have the opposite effect of feeling sad or depressed as newly acquired freedom

[4] As the next subsection demonstrates, a standard economic analysis also indicates potential benefits to becoming an empty nester.

(and a greater share of economic resources) may increase well-being through other opportunities. Hence, children leaving the home may generate further positive effects on the parents as it reflects well when children are successfully "fledged" (Clemens and Axelson, 1985).

The next subsection is a formal presentation of the economics and in particular discusses the roles of consumption and leisure with respect to the empty nest syndrome before the data description and empirical analysis of the next two sections.

2.2 The ENS and consumption and leisure

A traditional economic analysis of becoming an empty nester would focus on the two drivers of individual utility, consumption and leisure. In contrast, the literature surveyed above rarely considers these, and instead suggests other possibilities for changes in the utility of parents when they become empty nesters. Collectively, this suggests an additional element to the traditional utility function to capture utility derived or lost as a result of being an empty nester unrelated to any changes in consumption possibilities or leisure (which are, in turn, discussed below). Thus, a simple adapted utility function might look like this, with the utility from consumption (*C*), leisure (*L*), and from additional factors here termed psychological cost (*PC*) to distinguish it from the two economic drivers:

$$U = v\,(C, L, PC) \tag{1}$$

$$\text{with } v_C > 0,\ v_{CC} < 0,\ v_L > 0,\ v_{LL} < 0,\ v_{PC} < 0,\ v_{PCPC} > 0$$

Consumption and leisure are both expected to be positively related to utility, and subject to diminishing marginal utility. While the literature survey does not lead to firm direct predictions about being an empty nester and, as suggested by the word syndrome, the common expectation is that it is on the whole a negative experience.[5] This explains the expectation that these additional factors, termed psychological costs, will be negatively related to utility. Evidence for the existence of an empty nest syndrome (or associated positive feelings) can be found by looking for any change in utility that is over and above any utility derived by the changes in consumption and leisure which becoming an empty nester might involve. Equation (2) shows the total derivative of (1), which can be empirically tested, as discussed below.

$$\mathrm{d}v = \mathrm{d}C\frac{\partial v}{\partial C} + \mathrm{d}L\frac{\partial v}{\partial L} + \mathrm{d}PC\frac{\partial v}{\partial PC} \tag{2}$$

Within a narrower framework, an economic analysis can make predictions based upon how becoming an empty nester may affect utility via the channels of consumption and leisure. Predictions about the leisure channel seem clear: with less housework necessary for all new empty nesters, leisure time should increase. As a

[5] Though of course, the syndrome may have positive aspects independent of the changes in income and leisure. For example, the last child leaving may also be a cause of pride in a job well done.

consequence, the utility or satisfaction from leisure should increase too. Ceteris paribus, this should lead to an increase in overall utility. However, another change is with respect to consumption, and this outcome is more ambiguous. To investigate this ambiguity, consider two groups: those where income available for consumption increases, and those where such household incomes decrease (most likely when the leaving child has contributed more to the household's income than they have to its expenditure). Thus a hypothesis is that the income (i.e. consumption/expenditure) effects for empty nest parents can be (1) positive in situations where a similar amount of resources are distributed between fewer remaining members of the household; or (2) negative if empty nest parents have to support the leaving child(ren) financially in a separate home to a greater extent than when that child was resident in their household, or where the child was a net-contributor to disposable household income. For the first group it should be positive since utility increases because of increases in both leisure time and income for consumption; whereas for the second group the effect on overall utility is ambiguous, being dependent upon the relative strengths of the leisure benefits and income loss.

However, given that the financial relationship between the parent(s) and recently left last child is unknown, another possibility can be pursued. Since the analysis below tracks the leaving child, seemingly for the first time in investigations of ENS, we can approach the household income changes in an alternative way, and consider whether the child goes into employment or education. When the child leaves to go into employment, the empty-nester is expected to have more income available for own consumption. In contrast, when the child leaves for university, the child may not be fully independent and there may well be additional expenses for the empty-nester not picked up in the equivalised household income data. Thus, we have separate ceteris paribus outcomes for utility based upon what the leaving child does (based on these two options).

Child leaving for employment:

$$\mathrm{d}v = \underbrace{\mathrm{d}C\frac{\partial v}{\partial C}}_{\Delta\,\mathrm{d}C>0} + \underbrace{\mathrm{d}L\frac{\partial v}{\partial L}}_{\Delta\,\mathrm{d}L>0} + \underbrace{\mathrm{d}PC\frac{\partial v}{\partial PC}}_{\Delta\,\mathrm{d}PC<0} \qquad (3)$$

Child leaving for education:

$$\mathrm{d}v = \underbrace{\mathrm{d}C\frac{\partial v}{\partial C}}_{\Delta\,\mathrm{d}C<0} + \underbrace{\mathrm{d}L\frac{\partial v}{\partial L}}_{\Delta\,\mathrm{d}L>0} + \underbrace{\mathrm{d}PC\frac{\partial v}{\partial PC}}_{\Delta\,\mathrm{d}PC<0} \qquad (4)$$

For the first set of empty nesters, their utility from income for own consumption should go up; for the second group, down.[6] For both groups, their utility from leisure should go up. (The psychological cost element is discussed just below.) Whether these predictions are accurate is an empirical question. The dataset used in the analysis below contains information on income satisfaction, leisure time

[6] For the second group, this does depend upon whether the parents provide more net financial support to the leaving child when they are a student than when they were living in the household.

satisfaction and overall life satisfaction, and this satisfaction data can be used to give us information on utility from consumption, utility from leisure, and total utility. Given the expectation that, broadly, all empty nesters to have more leisure time (which can be checked via leisure time satisfaction data), it can be seen what happens to the income satisfaction and overall life satisfaction of these two distinct groups. Based on this analysis, those with the employed child should be more satisfied with their income, while those with their last child going to university should be less satisfied with their income. If there are no additional psychological factors, life satisfaction or the first group should increase, whereas for the second group the overall life satisfaction effect is more ambiguous (leisure gains, income losses). Table 1 summarises the predictions based on a traditional economic viewpoint

Table 1: Summary of changes for income, leisure and overall utility as predicted by standard economic theory.

	Consumption (and income satisfaction)	Leisure (and leisure satisfaction)	Overall (and life satisfaction)
New empty nester with (1) higher equalized household income or (2) last child goes into employment	↑	↑	↑
New empty nester with (1) lower equalized income or (2) last child pursues education	↓	↑	Equivocal

However, the outcome for overall life satisfaction might not be as expected by the traditional economic analysis. Recall that Section 2.1 suggests that an analysis based on consumption and leisure is too narrow, missing out potentially important non-pecuniary (and non-leisure) factors. Thus parental household budgets could indeed be improved markedly by having no resident children, which in turn could be boosted by the extra leisure time available due to no (or reduced) caring duties; however, the change in status to an empty nester affects parents in ways that could be manifest in loss and loneliness, collected within the catch-all term psychological costs above. Following on from checking whether the economic drivers accurately predict changes in income satisfaction (utility from consumption) and leisure satisfaction (utility from leisure), a check regarding whether the economic drivers fully predict the changes in life satisfaction (overall utility) can be made. This latter check answers the question of whether an economic approach or considerations based upon the psychological and sociological literature and everyday perceptions of becoming an empty nester is more appropriate. This question is more easily answered with the group where the economic prediction is unequivocally positive.

The next section discusses the data and empirical strategy regarding these open empirical questions.

3. Data and Empirical Strategy

This empirical investigation of the empty nest syndrome makes use of thirty-four consecutive years of the German Socio-Economic Panel survey, a rich longitudinal data set replete with abundant individual socio-economic information.[7] With its details about household size, income, life satisfaction, income satisfaction and leisure satisfaction, the SOEP is very suitable for this analysis. The panel structure of the survey enables the identification of new empty nesters, which are defined as individuals (either the head of the household, or the partner of the head of the household) whose last remaining resident child left the household within the previous year. Importantly, I strictly enforce a requirement that the empty nesters have the same marital status in the year before becoming an empty nester and within the first year of being an empty nester; this restriction ensures that any reduced well-being found for empty nesters is not caused by a marital breakdown.[8] Furthermore, the empty nesters are restricted to those where the SOEP follows the last child as they form a new household. This ensures a definitive identification of empty nesters, and not just parents whose children disappear from the dataset, as well as enabling the predictions made in the previous section testable.

Hence, the investigated parents are new empty nesters, having become so since the previous annual wave. As such the interest is in the initial 'shock' of becoming an empty nester, the situation where the parent(s) may not have had the chance to get used to their new situation. Following the criteria set out just above, I identify about 2,300 new empty nesters with life satisfaction data. Table 2 demonstrates that new empty nesters are indeed, on average, less satisfied with life, less satisfied with their income, and less satisfied with their leisure time. The life satisfaction averages seem to indicate the existence of the empty nest syndrome; however, this could reflect other differences between these two groups of parents. Table 3 below presents comparisons between the new empty nesters and nested parents for other potential variables of interest.

[7] A detailed description of this survey is given by Goebel et al. (2018).

[8] An empty nest can be caused by the removal of the child(ren) into the ex-partner's custody: clearly a situation which could (and does) confound any negative influence on well-being caused by becoming an empty nester, and is thus ruled out for the empty nesters. This same marital status restriction also applies to the nested to enable a better comparison.

Table 2: Empty Nesters and the Nested mean comparison: life satisfaction, household income satisfaction, and leisure time satisfaction.

	Empty Nesters			Pre–empty nesters		
	Observations	Mean	Standard deviation	Observations	Mean	Standard deviation
Life Satisfaction (scale 0-10)	2,352	6.84***	1.84	164,575	7.07	1.75
Household Income Satisfaction (scale 0-10)	2,344	6.27***	2.26	163,142	6.40	2.23
Leisure time Satisfaction (scale 0-10)	2,340	6.96***	2.15	151,258	6.47	2.26

Note: All three measures are positively coded, with higher scores meaning more life (or household income, or leisure) satisfaction. The stars indicate statistically significant differences (assessed via a t-test): *** p<0.01. SOEP data used: Socio-Economic Panel (SOEP), data for years 1984-2017, version 34, SOEP, 2017, doi: 10.5684/soepv33.

Table 3: Descriptive Statistics: recent empty nesters compared with pre-empty nesters, SOEP 1985-2017.

	Empty Nesters		Pre-Empty Nesters	
	Mean	Std. Dev	Mean	Std. Dev.
Real Annual Income	23.31***	33.18	27.13	31.02
Real Annual Household Income	44.53***	46.57	57.03	42.48
Employed	0.54**	0.50	0.60	0.49
Self-employed	0.06***	0.23	0.08	0.27
Apprentice	0.00	0.04	0.00	0.04
Government employed	0.05	0.22	0.06	0.23
Unemployed	0.08***	0.26	0.06	0.24
Not employed	0.12	0.32	0.12	0.32
Retired	0.14***	0.34	0.04	0.20
Military/community service	-	-	0.00	0.01
In education	0.00	0.04	0.00	0.06
Married	0.87	0.33	0.86	0.35
Separated	0.01	0.11	0.01	0.12
Divorced	0.06	0.25	0.07	0.25
Widowed	0.04***	0.19	0.02	0.14
Single	0.01***	0.11	0.04	0.20

Male	0.45***	0.50	0.48	0.50
Education: High School	0.59***	0.49	0.57	0.49
Education: more than HS	0.20***	0.40	0.26	0.44
Education: less than HS	0.21***	0.41	0.17	0.38
Overnight stay in hospital	0.12***	0.32	0.10	0.30
Age	53.77***	6.02	46.21	7.33
Observations	2,389		170,410	

Note: Apart from age (years) and the two income measures (thousands of euros, deflated by the CPI), all of the variables are dummy variables. The stars indicate statistically significant differences (assessed via a t-test): *** p<0.01; p<0.05**. SOEP data used: Socio-Economic Panel (SOEP), data for years 1984-2017, version 34, SOEP, 2017, doi: 10.5684/soepv34.

Table 3 shows that the nested have both a higher average real individual income and a higher average real household income. Perhaps related to these income averages, the nested are slightly more likely to be employed; in contrast, empty nesters are more likely to be retired. Regarding objective health, at least when judged by the proportion of each group who have stayed in hospital overnight in the previous calendar year, the nested are seemingly healthier than the empty nested. There is also a substantial difference in the age of these two groups, and the broad education categories reflect some difference between both groups. These differences, the nested being younger, richer and healthier than the new empty nesters in particular indicate the need for regression analysis to control for these differences.

In life satisfaction research it is often important (where possible) to consider unobserved individual heterogeneity, i.e. individual fixed effects. Many unobserved and unobservable (but unchanging or slowly moving) attributes may contribute to an individual's life satisfaction. Here, statistically, a Hausman test confirms this importance with respect to the particular equations estimated in this investigation: the individual fixed effects themselves are statistically significant. However, given the creation of the empty nest dummy variable the use of fixed effects can be problematic. Given that the 'within a person' change of moving from a nest to an empty nest in the subsequent year is, in longitudinal datasets, very similar to getting one year older and the change from one wave to the next, on its own fixed effects cannot estimate becoming an empty nester precisely enough. Given the importance of individual heterogeneity, i.e. fixed effects, for well-being, the chosen strategy is to use fixed effects after an entropy balancing process. In this investigation, this individual heterogeneity could be considered to include personality, religiosity, social capital, and cultural background including migration background, all of which may have an association with any empty nest syndrome.

Entropy balancing is a non-parametric modern matching technique (Hainmueller 2012), and in doing so make use of the Stata command *ebalance* (Hainmueller and Xu 2013). I use it to match new empty nesters and the nested with respect to the first three moments (where possible) of the lag (i.e. 'pre-treatment' values) of the variables listed in table 2. The coefficient on the empty nest dummy is thus the 'treatment' effect of becoming an empty nester compared to the counter-factual of

a very similar (i.e. 'matched') individual who remains nested. Entropy balancing is considered superior to more traditional propensity score matching for several reasons. This includes the technique being fully non-parametric, and thus does not rely on functional form; matching can take place on variance and skewness as well as the mean; entropy balancing is considered more effective at reducing the imbalance between treatment and control group. In this way entropy balancing addresses the previously mentioned issue of variables (age, wave, new empty nester) where the 'within' change moves in a very similar fashion by ensuring the first three moments of age identical for booth empty nesters and the pre-empty nesters. The changes to the variables following entropy balancing can be seen in a table in the appendix. Recent examples of the use of entropy balancing include investigations of childcare and maternal labour supply (Gambaro et al. 2018) and income support and life satisfaction (Hetschko et al. 2020).

Following this entropy balancing process, fixed effects estimation is employed to obtain coefficients for the new empty nesters and the set of control variables. The reported standard errors are robust to heteroscedasticity and clustered at the household level. The clustering at the household level is important because in the large majority of households two people will become empty nesters at the same time and, because of the longitudinal nature of the data, individuals from the same household feature multiple times in the sample. Here is the equation, estimated using fixed effects panel estimation after undertaking entropy balancing:

$$\mathrm{ls}_{it} = \mathrm{b}_o + \mathrm{b}_1\ \mathrm{emptynest}_{it} + \mathrm{X}_{it} + \mathrm{a}_i + \mathrm{u}_{it} \qquad (5)$$

Consequently, the dependent variable, ls_{it} , is life satisfaction indexed over individuals and time, X_{it} is a set of control variables, b_o is the standard intercept term, a_i is the individual fixed effect, and u_{it} is the error term. The main interest is in the coefficients obtained for b_1 which provide evidence for (if negative and significant) or against the existence of the empty nest syndrome. We then proceed to investigate income and leisure (including satisfaction with income and leisure) in ways commensurate with the discussion of section 2. The results are presented just below in section 4.

4. Results

Table 4 presents the results from four separate estimations. As the last section explains, the coefficients are obtained via fixed effects estimation following an entropy balancing procedure. Specifically, this procedure which matches the first three moments of the first lags of all of the control variables and the base categories, as well as age and year, between those who become empty nesters, the so-called treatment group, and those who remain nested, the control group. The four estimates are distinguished by the consideration of income: column 1 considers household income in the year before becoming an empty nester household; column 2 contemporaneous OECD equivalised household income; columns 3 and 4 also consider OECD equivalised household income but a dummy for an empty nester

whose income increases, and whose income decreases respectively. The main coefficient of interest is the empty nest dummy variable.

Table 4: Fixed effects regression results for the life satisfaction of empty nesters. SOEP 1985-2017. Dependent variable: Life Satisfaction (positively coded from 0 to 10)

VARIABLES	(1)	(2)	(3)	(4)
	Life Satisfaction	Life Satisfaction	Life Satisfaction	Life Satisfaction
New empty nester	-0.131***	-0.152***	-0.202***	-0.103**
	(0.038)	(0.039)	(0.071)	(0.045)
Household income (thousands), *t-1*	0.000			
	(0.001)			
OECD equivalised hold income		0.000***		
		(0.000)		
OECD equivalised hold income, *t-1*			0.000*	0.000*
			(0.000)	(0.000)
EN family more equiv HH income			0.099	
			(0.084)	
EN family less equiv HH income				-0.099
				(0.084)
Self-employed	-0.133	-0.134	-0.125	-0.125
	(0.083)	(0.084)	(0.085)	(0.085)
Government employed	-0.012	-0.020	-0.041	-0.041
	(0.167)	(0.162)	(0.157)	(0.157)
Not employed	-0.193**	-0.193**	-0.209**	-0.209**
	(0.080)	(0.081)	(0.081)	(0.081)
In education	-0.348	-0.336	-0.337	-0.337
	(0.228)	(0.228)	(0.230)	(0.230)
Unemployed	-0.839***	-0.835***	-0.849***	-0.849***
	(0.083)	(0.084)	(0.084)	(0.084)
Retired	-0.404***	-0.403***	-0.416***	-0.416***
	(0.086)	(0.087)	(0.087)	(0.087)
Military or community service	-0.028	-0.022	-0.036	-0.036
	(0.772)	(0.772)	(0.767)	(0.767)
Apprentice	0.076	0.071	0.081	0.081

	(0.241)	(0.239)	(0.236)	(0.236)
Married	0.392	0.376	0.386	0.386
	(0.546)	(0.545)	(0.544)	(0.544)
Separated	0.257	0.247	0.259	0.259
	(0.583)	(0.583)	(0.581)	(0.581)
Divorced	0.353	0.345	0.336	0.336
	(0.554)	(0.554)	(0.552)	(0.552)
Widowed	0.032	-0.018	0.026	0.026
	(0.600)	(0.599)	(0.599)	(0.599)
Education: high school	0.115	0.097	0.103	0.103
	(0.131)	(0.132)	(0.133)	(0.133)
Education: more than high school	-0.079	-0.088	-0.103	-0.103
	(0.208)	(0.208)	(0.210)	(0.210)
Overnight stay in hospital.	-0.283***	-0.281***	-0.275***	-0.275***
	(0.039)	(0.039)	(0.039)	(0.039)
Constant	7.024***	6.184***	6.329***	6.329***
	(0.583)	(0.773)	(0.780)	(0.780)
Observations	154,655	153,766	153,657	153,657
R-squared	0.025	0.026	0.026	0.026
Number of individuals	25,364	25,345	25,360	25,360
F-test for joint significance (p-value)	0.0000	0.0000	0.0000	0.000

Note: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1 Reference categories: single, employed, less than high school education. SOEP data used: Socio-Economic Panel (SOEP), data for years 1984-2017, version 34, SOEP, 2017, doi: 10.5684/soepv34.

Each column provides evidence of an empty nest syndrome: people who become empty nesters are less satisfied with life than they would in the counter-factual situation of remaining nested. The size of this coefficient changes based upon the different income controls. Column 1 controls for the lag of household income (I.e. the previous year's income) though The coefficients in this column are almost identical if the lag of individual household income is used, or if current individual income is used. It is inappropriate to consider current household income because it is endogenous with becoming an empty nester, however this change in household income that corresponds with becoming an empty nester can be investigated to see if income plays a mediating role as expected by conventional economic theory (see section 2). Column 2 considers equivalised household income (as measured by the OECD). If the departed child had no or very little income, equivalised household income would increase giving the household less more consumption possibilities, and more utility. Alternatively, if the last child to leave had an income of at least 25% (in a two person empty nest) or at least 33% (in a one person nest) of the then household income, OECD equivalised income would be reduced. If income matters,

as per economic theory, then the first group should experience an increase in well-being and the second group of empty nesters a decrease.[9]

Column 2 in table 4 basically replaces the lag of household income control variable with equivalised household income, and therefore takes into account the income change induced by becoming an empty nester. As the resulting new empty nester coefficient is slightly larger than that in column 1, a marginal role for income is indicated: when it is recognised that (on average) equivalised income goes up and control for it, the empty nesters are slightly less satisfied than before. Columns 3 and 4 include a dummy variable term indicating if the equivalised household income for the new empty nesters went up (3) or down (4). The variables are statistically insignificant from zero at conventional levels, however the coefficient on the empty nest dummy variable is somewhat instructive and, based on the coefficient size, also broadly indicates a small role for income: when the equations to regressions additionally acknowledge empty nesters with an increase (decrease) in equivalised household income, the life satisfaction of empty nesters in general is lower (higher) than the estimate (in) without this acknowledgement.

However, changes in household equivalised income may miss some important considerations (for example household costs) and not provide the full story with respect to discretionary expenditure (and thus utility increasing consumption possibilities). Empty nesters may still be financially supporting the last child even though the child no longer lives in the household. As discussed in section 2, this is particularly likely to be the case if the child leaves to pursue full-time education; and perhaps less likely if the child leaves and enters employment. Using the information about the last child to leave the household, it can be found out if there is a difference in the life satisfaction of new empty nesters based upon whether their child enters employment or education. Table 5 contains coefficients obtained from four separate regressions, three of which assess these two different categories of new empty nester.

Table 5: Fixed effects results for the empty nest syndrome, life satisfaction, household income satisfaction, leisure satisfaction and child's labour force status SOEP. Dependent variables: satisfaction variables (positively coded 0 to 10).

VARIABLES	(1)	(2)	(3)	(4)
	Life Satisfaction	HH Income Satisfaction	Leisure Satisfaction	Leisure Satisfaction
New empty nester	-0.205**	-0.328***	0.104	0.188***
	(0.091)	(0.109)	(0.110)	(0.044)
Left child in employment	0.083	0.326***	0.169	
	(0.103)	(0.122)	(0.123)	
Left child in education	0.291**	0.208	-0.197	
	(0.127)	(0.180)	(0.184)	

[9] In the sample, equivalised income goes up for about two-thirds of the households.

Household income (thousands), t-1	0.000	0.003***	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Self-employed	-0.136	-0.324**	-0.164	-0.162
	(0.084)	(0.126)	(0.158)	(0.158)
Government employed	-0.002	-0.141	0.284	0.306
	(0.169)	(0.186)	(0.284)	(0.282)
Not employed	-0.193**	-0.368***	0.627***	0.635***
	(0.080)	(0.078)	(0.095)	(0.094)
In education	-0.374	-0.759***	-0.001	0.019
	(0.234)	(0.272)	(0.304)	(0.292)
Unemployed	-0.847***	-1.143***	0.803***	0.811***
	(0.082)	(0.083)	(0.097)	(0.097)
Retired	-0.419***	-0.436***	1.044***	1.063***
	(0.087)	(0.106)	(0.110)	(0.111)
Military or community service	-0.029	-0.359	-0.001	0.005
	(0.773)	(0.961)	(0.510)	(0.509)
Apprentice	0.071	-0.185	-0.184	-0.172
	(0.240)	(0.349)	(0.418)	(0.415)
Married	0.385	0.791	0.252	0.259
	(0.541)	(0.552)	(0.649)	(0.646)
Separated	0.357	0.262	0.976	1.012
	(0.576)	(0.601)	(0.738)	(0.734)
Divorced	0.387	0.317	0.691	0.702
	(0.548)	(0.566)	(0.699)	(0.696)
Widowed	0.025	0.507	1.020	1.028
	(0.596)	(0.602)	(0.712)	(0.710)
Education: high school	0.104	0.132	0.210	0.233
	(0.132)	(0.143)	(0.187)	(0.186)
Education: more than high school	-0.102	0.318	0.004	0.040
	(0.210)	(0.220)	(0.265)	(0.264)
Overnight stay in hospital	-0.278***	-0.026	0.040	0.036
	(0.039)	(0.040)	(0.050)	(0.050)
Constant	7.067***	6.725***	4.979***	4.249***
	(0.588)	(0.942)	(0.819)	(0.833)
Observations	154,509	154,078	142,229	142,375
R-squared	0.025	0.030	0.026	0.026
Number of individuals	25,354	25,339	23,613	23,626
F-test for joint significance (p-value)	0.0000	0.0000	0.0000	0.0000

Note: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1 Reference categories: single, employed, less than high school education. SOEP data used: Socio-Economic Panel (SOEP), data for years 1984-2017, version 34, SOEP, 2017, doi: 10.5684/soepv34.

Column 1 of table 5 demonstrates that being an empty nester is, overall, associated with lower life satisfaction, thus providing further evidence for the empty nest syndrome. However, this overall result is nuanced. This overall result holds if the child's labour force status after leaving is employment, while this loss of well-being is fully compensated for if the child leaves the nest and enters education.[10] Given the presumption about financial support being more likely for children who enter education, these results are in stark contrast to conventional economic theory. Indeed column 2 shows that income satisfaction decreases for empty nesters, however this is largely compensated if the child enters employment (just based on simple coefficient sizes); there is no such compensation for parents whose child enters education. This latter result suggests an increased financial burden for new empty nesters whose child enters education, in line with the predictions of section 2. Taken together this indicates that parents whose child left the nest to enter education suffer lower income satisfaction but more life satisfaction. (Post-estimation tests reveal that the coefficients for the two groups of empty nesters are statistically different from each other.)

While indicative of no role for income in moderating any empty nest syndrome, these results do not necessarily mean that income is unimportant. The coefficients above represent average effects, and the impact might be systematically different for rich and poor parents. The rich might be able to take the new financial situation and obligations in their stride unlike the less wealthy who may encounter a liquidity constraint. The estimation for column 1 was rerun for a sample of the top third of households in terms of household income, and the bottom, third. The sample size is too small to draw any strong conclusions, but the results (not shown) are indicative of strong parental pride in the bottom third of households, when measured by household income. Given the sample size issues – these 30 plus years of data contain only 42 observations of new empty nesters from poor households where the last child left the household to undertake education - a more dedicated dataset regarding income and decisions regarding education might be better able to untangle this possibility. This seems to support the claims of income not being so important for the empty nest syndrome, however this conclusion is complicated by the system of student finance in Germany where the state, through the *Bundesausbildungsförderungsgesetz*, supports students from low income households and lessens the burden on the parents, here the new empty nesters.[11]

[10] Linear combinations of the coefficients demonstrate that new empty nesters whose last departed child enters employment have reduced life satisfaction, unlike those whose child enters education where there is no overall effect (a positive association counteracts the evidence for the negative empty nest syndrome.)

[11] The SOEP does provide information on whether those in full-time education receive some kind of financial support, but the amount is concomitant with the low numbers in the dataset of the empty nesters from poor households whose nest has been emptied by the last child entering education, and thus in the context of an empty nest investigation, not enough for analysis.

Taken together, the results suggest only a marginal role for any moderating influence of income changes induced by a reduced household size; the empty nest syndrome is not compensated for by any increased income by parents in those households who experience such a change. Section 2 also considered the change in leisure time that becoming an empty nester entails. Less ambiguous than income changes, parents presumably have more time for leisure and hobbies, and have to do less housework, following the last child leaving the house. As section 3 shows, the SOEP has information on satisfaction with leisure time and information about time spent for hobbies and housework. The empty nesters do not report any significant difference with time spent for housework compared to the nested, however they do report having approximately 5 hours per week more time for hobbies and leisure.[12] Furthermore, the empty nesters have, on average, half a point higher satisfaction with leisure time (on an 11-point scale) than the nested. A resultant question is, therefore, whether this increased time for leisure and increased satisfaction with leisure time moderate the empty nest syndrome. Columns 3 and 4 answer this question. Column 4 demonstrates that empty nesters have, ceteris paribus, more satisfaction with their leisure than pre-empty nesters.[13]

Including reported time available for hobbies and leisure as an additional control for the estimation that resulted in column 1 of table 4 (the main overall results) can also answer this question. While the amount of time available, being statistically insignificant (ceteris paribus), is not directly associated with life satisfaction it does play a small indirect role in compensating for the loss of life satisfaction experienced by new empty nesters: the coefficient for the empty nesters is -0.15 compared to table 4's -0.11. Hence, the empty nest syndrome is stronger (i.e. a larger life satisfaction reduction for empty nesters) when the increased leisure time of new empty nesters is taken into account.[14] When this satisfaction with leisure time is added as a control variable to table 4's estimate the outcome is very similar to that for the amount of time for hobbies and leisure. In other words, controlling for the increased satisfaction with leisure time of empty nesters results, on average, in a larger loss of well-being.[15] Thus both results are indicative of a moderating role for leisure, though not one that offers much relief, on average, to new empty nesters.

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[12] Comparisons with the year before an individual becomes an empty nester are instructive: new empty nesters report just over one hour of housework less per week; they report just over one hour less for hobbies; and they also report a very similar amount of hours worked in the last year before becoming an empty nester as a new empty nester. This time use data is only available for about 40% of the sample.

[13] Column 3 shows no difference whether the child left for employment or education, which is unsurprising, and expected, given that this distinction should only make a difference to income and not leisure time.

[14] As expected, given the descriptive statistics, housework undertaken per week plays no moderating role regarding the empty nest syndrome (results not shown, but available upon request).

[15] Having a subjective satisfaction variable on the right-hand side as well as a dependent variable may be subject to an individual's reporting bias. If this bias is constant (or at least only slowly moving) over the duration of the dataset, the individual fixed effect can be said to take this into account. For the purposes of this investigation it was enough just to provide some support of the more objective measure of leisure time, the amount of hours per week an individual spends on hobbies.

5. Concluding discussion

Using multi-year, nationally representative panel data, this study has provided evidence of the empty nest syndrome. On average, parents are less satisfied with their lives following the 'shock' of becoming an empty nester. Importantly, this study ruled out the possibility that the empty nest situation may have occurred because of a relationship breakdown, and hence it being less clear whether the lower life satisfaction reflected this breakdown or the empty nest syndrome. This study also demonstrated a different impact based upon what the leaving child goes on to do. Parents whose children leave for university experience an increase in life satisfaction that is enough to compensate for the empty nest syndrome; in contrast, there is no such compensation for parents whose child leaves for full-time education. Both the ruling out of a relationship breakdown and the tracking of the last child are novel in a quantitative assessment of the empty nest syndrome.

This study offered some support for an economic analysis of ENS, but not full support. Thus income (as a means of consumption) and leisure were found to contribute to individual utility as predicted by standard economic analysis. Furthermore income satisfaction increased for individuals whose last child went into employment, and were therefore presumably less of a financial burden, and income satisfaction decreased for individuals whose last child left for the purposes of full-time education. This is also both as expected and established in the theoretical discussion. For both groups, also as expected, leisure time and satisfaction with leisure time increased: on becoming an empty nester, parents reported having more free time and more contentment with their free time. However, these two outcomes did not lead to what standard economic theory would expect for overall utility, captured by overall life satisfaction, suggesting that there is more at play than just the two key economic drivers of utility. Indeed, the group with lower income satisfaction were much more satisfied overall, than the group with more income satisfaction. This outcome, in stark contrast to orthodox economic theory, can be seen as offering some support to the claim that "economists… are used to thinking, possibly incorrectly, of pecuniary factors as providing most of life's well-being" (Blanchflower and Oswald 2004, p.1373).

Future research should test this result with other high-quality panel datasets from around the world. This outcome was found for Germany, but what about other countries with different cultures, different norms about family, and potentially important differing fee regimes for higher education. More nuance is possible than that presented above. The age of the child when leaving the nest may well be important. Attempts to investigate this using sample splits based on the child's age (not shown) were not revelatory. Specifically controlling for the age of the child in the estimates is not possible within the fixed effects estimation framework. Neither is the well-being of the child after leaving the nest. While this might indicate the success (or otherwise) of the transition, and thus be potentially important, fixed effects cannot estimate the association of this 'child' well-being with parental well-being. Future studies should try to do so. The age of the parents is also an

issue that deserves future research. Brief analysis not shown suggests that younger parents suffer more than older ones from the last child leaving. Parental age was one of the variables matched by entropy balancing in the analysis above, partly to enable a fixed effects analysis.

In summary, economic analysis was used to investigate the income and leisure changes associated with becoming an empty nester. Satisfaction changes with changes in income and leisure demonstrated support for predictions made by conventional economic analysis. Though the outcome for overall utility, captured by life satisfaction, showed that there are other drivers neglected by a narrow focus on income for consumption and leisure. This suggests that an interdisciplinary approach may well be fruitful, as might a mixed methods investigation combining large sample quantitative findings with a deeper investigation regarding how people feel about their becoming an empty nester. Finally, this investigation has shown that tracking what the leaving child does is important, and needs to be a feature of future studies of the empty nest syndrome. For Germany, over the past thirty years, the child leaving the household for the purposes of education offers some compensation for the parents against the lower life satisfaction induced by becoming an empty nester. There is no such finding if the child leaves for the purposes of full-time employment.

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Appendix

Table A1: Descriptive Statistics: Recent empty nesters compared with pre-empty nesters, SOEP 1984-2017.

	Before entropy balancing				After entropy balancing	
	Empty Nesters (treatment)		Pre-Empty Nesters (control)		Pre-Empty Nesters (control)	
	Mean	Variance	Mean	Variance	Mean	Variance
Real Annual Income (lag)	25.23	1528	27.21	939.4	25.23	1528
Real Annual Household Income (lag)	64.92	3238	56.94	1721	64.91	3238
Employed (lag)	0.57	0.24	0.63	0.23	0.57	0.24
Self-employed (lag)	0.06	0.06	0.08	0.08	0.06	0.06
Apprentice (lag)	0.002	0.003	0.002	0.002	0.003	0.003
Government employed (lag)	0.06	0.05	0.06	0.06	0.06	0.05
Unemployed (lag)	0.08	0.07	0.06	0.06	0.08	0.07
Not employed (lag)	0.12	0.11	0.12	0.11	0.12	0.11
Retired (lag)	0.10	0.09	0.04	0.03	0.10	0.09
Military/community service (lag)	-	-	0.00005	0.00005	-	-
In education (lag)	0.002	0.002	0.004	0.004	0.002	0.002
Married (lag)	0.87	0.11	0.85	0.12	0.87	0.11
Separated (lag)	0.01	0.01	0.01	0.01	0.01	0.01
Divorced (lag)	0.07	0.06	0.07	0.06	0.07	0.06
Widowed (lag)	0.01	0.01	0.04	0.04	0.01	0.01
Single (lag)	0.01	0.01	0.04	0.04	0.01	0.01
Male (lag)	0.45	0.25	0.47	0.25	0.45	0.25
Education: High School (lag)	0.58	0.24	0.61	0.49	0.58	0.24
Education: more than HS (lag)	0.21	0.17	0.21	0.41	0.21	0.17
Education: less than HS (lag)	0.20	0.16	0.17	0.14	0.20	0.16
Overnight stay in hospital (lag)	0.12	0.10	0.10	0.09	0.12	0.10
Age	53.74	35.35	46.26	53.33	53.74	35.34
Observations						

Note: Apart from age (years) and the two income measures (thousands of euros, deflated by the CPI), all of the variables are dummy variables. SOEP data used: Socio-Economic Panel (SOEP), data for years 1984-2017, version 34, SOEP, 2017, doi: 10.5684/soepv34.

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