Why do immigrants report lower life satisfaction? Explanations for the decrease in life satisfaction of immigrants in Germany over time

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Abstract

We investigate the life satisfaction trajectories of immigrants in Germany over the course of their stay in the host country. Using data spanning from 1984 to 2015, we find that recently arrived immigrants are more satisfied than comparable natives, but that their life satisfaction decreases more over time than that of their German counterparts. We establish the following results: In the initial waves of our data (the late 1980s) immigrants were becoming relatively more satisfied over time, but in later waves, they were becoming less satisfied the longer they stayed in Germany. Immigrants from Poland and the former Soviet Union do not display an association between years-since-migration (YSM) and life satisfaction, but immigrants from Turkey, the former Yugoslavia, Italy, Spain and Greece do. The negative YSM effect is neither explained by selective attrition of immigrants nor by inclusion of variables that proxy immigrants' integration in German society, or the permanence of their stay. Including measures of self-assessed health reduces the YSM coefficient to zero. We explore the possibility of explaining the YSM effect by changes in the reporting of life satisfaction over time. For this purpose, we propose and estimate an innovative model which allows years since migration and self-assessed health to affect reporting behaviour over time. We demonstrate that these variables can have effects both on the level of life satisfaction but also on how these levels are reported. Overall, our findings contribute to a better understanding of immigrants' life satisfaction post-migration, a topic that is increasingly of great concern to policymakers in countries with high rates of immigration.

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1. Introduction

Immigration and the assimilation of immigrants have been long-standing questions of interest for economists, dating back to at least Chiswick (1978). Since then immigration and its consequences have become important phenomena, and also policy concerns, in almost all developed countries. Germany received more than one million refugees over the course of 2015[1] against a background of wide scepticism about its ability to absorb and assimilate such an inflow of immigrants. The happiness of immigrants is likely to be an indicator of the success or failure of this effort, either as a cause or consequence. Immigrants' subjective well-being (SWB), i.e. self-reported ratings of their own well-being, should be a central concern of policymakers as it can be seen as one dimension for successful integration in the host society. Moreover, higher SWB has been linked to increased productivity (Oswald, Proto and Sgroi, 2015), better health outcomes, and income (Graham, Eggers and Sukhtankar, 2004), all of which would be beneficial for the host economy. Our study contributes to the literature on migration and SWB by investigating the well-being trajectories of immigrants after they arrive in Germany, and possible explanations for the observed patterns. The analysis thus contributes to our understanding of the long-term outcomes of migration and may allow policymakers to better consider the psychological needs of newly settled migrants.

Neoclassical microeconomic theory of migration assumes that migrants carefully weigh the costs and benefits of migration and only leave their home countries if the potential benefits exceed the costs, thus maximising their long-term utility (e.g., De Jong et al., 1983; Sjaastad, 1962). Many early studies on the outcomes of migration focused on economic assimilation (e.g., Harris and Todaro, 1970), and indeed migrants often experience an increase in household incomes (e.g., Nikolova and Graham, 2015). However, although

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[1] See http://www.welt.de/politik/deutschland/article150678614/1-1-Millionen-Fluechtlinge-kamen-2015-nach-Deutschland.html.

migration is often motivated by economic factors, decades of SWB research in economics and psychology confirm that people quickly adapt to increases in income with respect to their SWB (e.g., Easterlin, 2001). In addition, life in the host country is often different than what migrants expected. Employment might not materialise easily and its lack may thus bring psychological hardship (the negative association between unemployment and SWB has been well documented, e.g., Clark, 2003; Lucas et al., 2004). A study using German data found that unemployment is more detrimental to the SWB of male immigrants than any other groups, including German men (Leopold, Leopold and Lechner, 2017). In addition, immigrants are often employed in low-skill jobs that may be dangerous to health and lead to declining satisfaction with health in addition to reduced job satisfaction. Lack of family support and social embeddedness, assimilation problems, and possible discrimination may further decrease SWB.

Studies that only consider employment and income as relevant consequences of migration may therefore underestimate the true social impact of migration as individual well-being also depends on family, health, social connections, and other aspects that may be difficult to capture with objective measures alone (e.g., Diener et al., 1999). Limited rational humans rarely manage to adequately anticipate the well-being consequences of their decisions, a phenomenon that has been termed affective forecasting by psychologists (e.g., Wilson and Gilbert, 2003), and migration decisions may therefore not necessarily maximise utility. A central question of studies on migration therefore remains whether migration is indeed beneficial for the migrant. Employment and income capture only a small part of the migration experience and SWB measures can therefore be employed to more adequately assess experienced utility (Kahneman, Wakker and Sarin, 1997).

To date, the long-term consequences of migration on individual well-being have been rarely investigated as many studies simply compare the well-being of migrants to that of

stayers in the home country or natives in the host country. In contrast, the present study analyses the well-being patterns of immigrants after they arrive in Germany and proposes six possible explanations for the observed decreasing trajectory. We build on a number of findings (discussed below) which suggest that immigrants are in general less satisfied with their lives than natives in their host country, or that at any rate their subjective well-being tends to decrease over time compared to that of natives. Similar to Obućina (2013) and using the same data, the German Socio-Economic Panel (henceforth SOEP), we find that recently arrived immigrants in West Germany report higher levels of SWB than similar natives, and that their well-being approaches and finally drops below that of natives (we refer to this as the years-since-migration, henceforth YSM, effect). Contrary to the existing literature, we explore the robustness and origin of this finding with regard to 1) the stability of the effect over time, 2) selective attrition, 3) the inclusion of measures of how integrated the immigrant is, 4) the relevance of ethnic background, and 5) the inclusion of different health-related variables. Finally, we introduce an innovative approach to distinguish between changes in reporting behaviour and genuine satisfaction effects of YSM in an ordered logit model.

We find that 1) regression models performed over the whole sample period (pooled OLS, fixed effects, ordered logit, fixed effects ordered logit) suggest a negative YSM effect on the SWB of the immigrant, 2) year-specific models show that the negative YSM effect appears only in the late 1980s when it switches from being positive to significantly negative, 3) the effect is not driven by selective attrition, 4) the effect is not a result of different degrees of the integration of immigrants, 5) there are some important differences between ethnic groups: immigrants from the former Soviet Union and Poland do not exhibit a YSM effect, and 6) changes in objective health-related measures do not fully explain the effect, whereas including subjective self-assessed health measures reduces the YSM effect to zero. We also

find evidence that health and YSM affect both life satisfaction (LS hereafter) as well as the reporting behaviour.

2. Literature

2.1 SWB and migration

Measures of subjective well-being have increasingly drawn the attention of economists, with the implicit or explicit understanding that they approximate utility, or capture one of its major components (Kahneman, Wakker and Sarin, 1997; Frey and Stutzer, 2002; Di Tella and MacCulloch, 2006). SWB measures have been used to 'price' non-market goods (e.g. air traffic noise in van Praag and Baarsma, 2005, and air quality in Levinson, 2012), put forward to improve on quality of life measures used in health-care provision (Brazier and Tsuchiya, 2015), and been advocated (or at least discussed) as a measure or proxy of utility or welfare (Frey and Stutzer, 2002; Di Tella, MacCulloch and Oswald, 2003; Layard, 2005; Fleurbaey, 2009; Ananda, Krishnakumarb and Tran, 2011).[2] Moreover, they have been identified as important policy tools (Dolan and White, 2007; Dolan, Layard and Metcalfe, 2011) because objective measures of well-being, such as GDP or individual incomes, only reveal a partial picture of true well-being in a society (Stiglitz, Sen and Fitoussi, 2009). Measures of SWB allow respondents to evaluate for themselves which domains of life are important for their well-being and form their well-being judgments based on these. SWB measures have been found to be reliable and valid (Diener, Oishi and Lucas, 2003; Layard, 2010; Dolan, Layard and Metcalfe, 2011; OECD, 2013) and are now being adopted by a number of governments to complement traditional measures of societal progress such as GDP (e.g., in the UK: Hicks et al., 2013; O'Donnell and Oswald, 2015).

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[2] The advocates of using-happiness-as-utility also have their detractors and sceptics: In a recent paper Benjamin et al. (2014) find important deviations between anticipated well-being of available choices and the actual choices that were made, Loewenstein and Ubel (2008) draw attention to the adaptation to SWB of individuals with serious chronic health conditions, and Bertrand and Mullainathan (2001) point to the biases induced by random and non-random noise in self-reported happiness.

A nascent literature increasingly incorporates subjective well-being measures to assess reasons for migration and its consequences on migrants and natives in the destination country. With respect to the latter, immigration has been found to be positive for the SWB of natives, partly because of the cheap goods and services provided by immigrants (Akay, Constant and Giulietti, 2014). In contrast, a recent study found the life satisfaction of Whites in the US to be negatively associated with local rates of immigrant populations and racial diversity (Kuroki, 2018).

It is more difficult to assess whether migration increases the SWB of migrants because longitudinal datasets rarely provide before and after migration measures of SWB, except for studies on internal migration (i.e. within a country). Internal migrants in Thailand that moved due to employment opportunities reported lower post-move satisfaction (De Jong, Chamratrithirong and Tran, 2002), while internal migrants in Sweden reported higher post-move LS, especially if they moved for work-related reasons (Switek, 2016). An investigation of responses from twelve waves of the British Household Panel Survey in the UK showed that internal migrants experienced an initial boost in SWB when they migrated. However, on average, they experienced decreased SWB before they migrated and the subsequent boost in SWB thus mostly brought them back to their previous SWB (Nowok *et al.*, 2013).

However, internal migrants do not have to adapt to a new culture and, in many cases, language, and their SWB outcomes may therefore differ substantially from that of international migrants for whom before and after-immigration information is rarely available. A rare exception is a study by Stillman and colleagues (2015) who exploit the random assignment of immigration status to immigration applicants from Tonga through a lottery. Tongans who won the lottery and therefore gained the right to emigrate to New Zealand and subsequently immigrated reported the same level of SWB as Tongans who did not win the lottery and stayed in Tonga, despite having improved economically. The difference was

especially large in the first year after migration (Gibson *et al.*, 2015). Using the European Social Survey (ESS) data, Bartram compares stayers to migrants who moved to wealthier countries in Europe (Bartram, 2013). Indeed, migrants seem to be happier than stayers but this difference may be driven by the fact that happier people are more likely to migrate. Research employing Canadian data also showed that immigrants in Canada had generally higher SWB than stayers in their home countries (Frank, Hou and Schellenberg, 2016). People select into migration and it is therefore plausible that SWB is one of the determinants of the decision to migrate. Indeed, a recent study using data from 35 European and Central Asian countries found that respondents reporting either the highest or lowest levels of LS were the most likely to express intentions to emigrate (Ivlevs, 2015).

Findings on the well-being outcomes of migration often differ by host countries. Recent immigrants have been shown to have higher levels of SWB in the UK (Dorsett, Rienzo and Weale, 2015). Migration has also been found to be associated with higher SWB and satisfaction with freedom across a number of transition economies that were included in the Gallup World Poll (Nikolova and Graham, 2015). Bartram (2011) finds a negative coefficient on being an immigrant in the United States in a cross-section of the World Values Survey. Safi (2010) provides the most comprehensive international evidence on this negative association: using the ESS immigrants report lower levels of LS in all of the 13 European countries included in the study, with LS being lowest among immigrants who arrived in the host country 5 to 10 years ago. The paper does not discuss whether the latter finding is a cohort effect, or a genuine change in the LS of immigrants over time. This finding is replicated by Olgiati et al. (2013) using the Gallup World Poll in a pooled sample of European and Anglo-Saxon countries. The study reveals that LS is positively associated with income in only a few countries. The authors conclude that in the long-run non-pecuniary factors may be more important for immigrants' SWB and income thus only positively affects

recent arrivals (Olgiati, Calvo and Berkman, 2013). Whether these findings relate to the actual immigration experience rather than, for example, immigrants being selected from particularly unhappy people or coming from "unhappy" countries, could not be established with the used data as the immigrants' happiness before migration was not available.

Our data do not include pre-migration SWB and we do therefore not know if migrants experienced a temporary boost in SWB shortly after arrival. However, we can explore the post-migration trajectory of their SWB and compare their reported well-being to that of German natives. Erlinghagen (2011) examined the SWB of German emigrants, non-emigrants and remigrants using the ESS data and found that emigrants reported higher SWB compared to non-emigrants and remigrants; suggesting that emigration is either selective and/or indeed beneficial for SWB. However, other studies found that immigrants generally report lower SWB (Verkuyten, 2008; Safi, 2010).

2.2 Immigrants in Germany

Germany has one of the highest shares of immigrants in the European Union and therefore provides a good example for a careful investigation of post-migration well-being trajectories. Many immigrants arrived in West Germany during the 1960s when the West German government and industry actively recruited 'guest workers' from Mediterranean countries (Turkey, Italy, Spain, Greece, and Yugoslavia). The intention of the guest worker programme was to employ these workers temporarily in typically low-skilled blue-collar jobs and it was expected that they would return to their home countries after the expiration of fixed-term contracts. However, after the end of the guest worker programme in 1973, many of the four million migrants who resided in Germany at that time decided to settle there (Elkeles and Seifert, 1996). Restrictive German citizenship laws concerning naturalisation and dual citizenship meant that many guest workers, and even their children who were born in Germany, did not easily acquire German citizenship, which may have hindered assimilation

(Haisken-DeNew and Sinning, 2010). Immigrants who arrived since the late 1980s were often ethnic Germans from Poland, Romania and Russia (so-called 'Aussiedler'), who were often already familiar with the German culture and language. Most of the respondents in our dataset are originally from the Mediterranean countries and overwhelmingly settled in West Germany.

The present study builds on previous research on migration to Germany and extends possible explanations for the YSM effect. West Germany has a high share of immigrants compared to other European countries, such as Great Britain, and most of these immigrants live in households in which all members of the household are of the same ethnic origin (Büchel and Frick, 2005). Living in such 'non-mixed' households may have adverse effects on social integration as ethnic concentration may increase the transaction costs of communicating with natives (Danzer and Yaman, 2013). However, using data from the SOEP, Kóczán (2016) found that differences in SWB between German natives and immigrants in Germany can be mostly attributed to economic factors, such as their employment status, rather than social integration. The Kóczán study further implies that immigrants in Germany are affected by economic shocks such as unemployment in a similar way to natives.

Obućina (2013) used panel data from Germany from 1994 to 2009 to analyse the dynamic aspects of immigration and happiness. In a Mundlak-type random effects model he finds that recently arrived immigrants report higher levels of happiness than German natives, but their level of happiness drops linearly with time and ends up well below the level of their German peers.[3] He offers a plausible explanation that an immigrant who arrived in Germany many years ago will feel dissatisfied if his income is the same as an otherwise equal but recently arrived immigrant. While the data and methodology are more suited to answer

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[3] A negative years-since-migration effect is also found by Taengnoi (2014) for the US.

dynamic aspects of happiness, many possible explanations for the years-since-migration effect have remained unexplored. The present paper fills this gap.

2.3 Potential explanations for the Years-since-migration (YSM) effect

The length of the stay in the host country may affect subjective well-being for a number of reasons. For instance, it is an important factor for language proficiency, which helps migrants with social assimilation and employment choices. While recently arrived immigrants clearly perform worse in economic terms compared to natives, they usually improve their economic position over time (Büchel and Frick, 2005). These positive changes would suggest an upward sloping subjective well-being trajectory for immigrants, but the SOEP data show the opposite.[4] We propose and test five alternative explanations for the observed negative YSM effect, namely 1. potential selective attrition of immigrants, 2. integration in German society and permanence of their stay, 3. differences by ethnic background, 4. declines in health over time, and 5. changes in the reporting of LS over time. We will briefly review the literature on each of these aspects in turn.

One candidate explanation for the YSM effect is non-random attrition as more successful (and thus probably more satisfied) immigrants may decide to return to their home countries once they have met their objectives, leaving in Germany immigrants who fall short of their targets and are less satisfied. We will investigate the potential effects of attrition, and also the stability of the YSM effect in our empirical analysis; these two topics have, to our knowledge, not been explored in the literature.

We further consider how well integrated immigrants are in German society and in which country they see their future. Some of the SWB gaps between first-generation immigrants and natives in a set of European countries could be explained by differences in

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[4] Some studies have found that the length of stay is not associated with SWB; for example in a sample of legal and illegal immigrants in Italy (D'Isanto, Fouskas and Verde, 2016).

social embeddedness (Arpino and de Valk, 2017). A recent study based on a Dutch sample showed that differences in LS between natives and immigrants could be explained by financial problems and stronger feelings of social isolation (de Vroome and Hooghe, 2014), i.e. both economic and social disadvantages. There is also some evidence of the effect of assimilation on SWB, for example, second generation migrants have been found to be closer to the natives' SWB than first generation migrants in several samples, e.g. the ESS (Kirmanoğlu and Başlevent, 2014). In a sample of high-skilled immigrants in Israel, LS was found to contribute to immigrants' sense of belonging (Amit and Bar-Lev, 2015). The same Israeli study also showed a negative association between YSM and LS.

Social networks are important for SWB overall and that is also true for immigrants. In a sample of legal and illegal immigrants in Italy, legal immigrants with at least one kin in the destination country reported higher levels of SWB than those with no kin (D'Isanto, Fouskas and Verde, 2016). Another study employing SOEP data has shown that cultural assimilation is positively associated with SWB. However, this effect is just significant for established immigrants, not for recent arrivals (Angelini et al., 2015)

We next investigate whether there are important differences across ethnicities with regards to the YSM effect. Indeed, immigrants' LS may depend both on the features of the host country and the country of origin, i.e. the cultural heritage (Voicu and Vasile, 2014). For example, French natives report lower levels of SWB than other Europeans, even when they live abroad while immigrants in France are not less happy than immigrants in other countries (Senik, 2014). Migrants' integration in German society, as measured by their feelings of national identity with the host country (compared to their country of origin), differs considerably between ethnicities and may depend on the degree of cultural and social distance between Germany and the home culture (Dustmann, 1996). Dustmann (1996) found

that migrants from Turkey and Greece who settled in Germany displayed the lowest degree of national identity.

Ethnicity may affect the consequences of migration in several ways. First, whether life is indeed better in Germany may depend on the reasons for migration which are often tied to the country of origin and thus ethnicity. Further, migrants that are from countries with a large proportion of migrants in the host country may benefit from networks through friends and kin, which may help with job searches and socialising. Belonging to an ethnic minority group has previously been shown to be negatively associated with SWB (e.g. Kirmanoğlu and Başlevent, 2014), possibly due to problems with assimilation to the majority culture and potential discrimination (e.g., Michalos and Zumbo, 2001). For example, a previous analysis of 2001 SOEP data has shown that immigrants from the former Yugoslavia assimilated more to German culture than Greeks, Italians, Spaniards and Turks (Constant, Gataullina and Zimmermann, 2009). Non-economic factors, such as a positive attitude towards immigrants, have been found to be important for immigrants' SWB across a number of European countries (Hendriks and Bartram, 2016). Moreover, levels of perceived discrimination differed between ethnic groups in 13 European countries (Safi, 2010).

Immigrants partly select on health, i.e. those who emigrate from their home countries are more likely to be healthy and thus they are also likely to have better health than natives (Farré, 2016). This so-called 'healthy immigrant' effect has also been observed in Germany, however, immigrants' health status decreases over time especially for those in physically demanding jobs (Giuntella and Mazzonna, 2015). Migrants are often employed in blue collar jobs which may be associated with higher physical demands and stress. First generation migrants in Germany were found to be less likely to contact medical specialists than native Germans or second generation migrants (Glaesmer et al., 2011), although they were more likely to contact general practitioners. Wengler (2011) found that Turkish immigrants report

lower health status than native Germans, although these differences disappeared once socio-economic status and coping resources were accounted for. Similarly, Nesterko et al. (2013) used the SF-12v2 to assess associations between the SWB of immigrants and their health-related quality of life. They observed only small differences between immigrants and native Germans. Assessments of health significantly predict SWB and may be partly determined by the immigrant's cultural background (Ljunge, 2016). Previous studies investigating the health satisfaction of migrants compared to German natives have found that migrants are generally not less satisfied with their health. However, differences between migrants and Germans were observed if they were unemployed (Elkeles and Seifert, 1996). The cultural differences in the host country and lack of family and friendship ties may further lead to mental health problems as social support networks can buffer the negative mental health effects of 'acculturative stress' (Rogers-Sirin, Ryce and Sirin, 2014).

As a last explanation for the YSM effect we consider changes in internal LS rating scales. Migrants often experience a profound change in their life circumstances when they move to another country, especially if the culture differs considerably from that in their home country. It is therefore plausible that the assimilation to a new country may lead to a gradual change in internal LS rating scales over the life course, possibly caused by changes in their reference points over time. For example, they may start comparing themselves to natives rather than people in their home countries. A recent study implied that international migrants actually maintain reference groups in their home country and at the same time start to compare themselves to stayers in the host country (e.g., Gelatt, 2013). Simpson (2013) assumes that low-skilled migrants, who usually have low levels of assimilation and earn less than natives, will compare themselves to stayers in their home country. High-skilled migrants, on the other hand, often earn more than natives and enjoy higher levels of assimilation. A study using Australian data found that immigrants in Australia seem to fairly

quickly adapt their happiness standards to that of the host country, i.e. their SWB depends to a large extent on the circumstances of the host country, something the authors term 'happiness assimilation' (Pakrashi and Frijters, 2013).

We will consider all of these six candidate explanations for the negative YSM effect in Germany in our empirical analysis.

2. Data and measures

We use data from the German Socio-Economic Panel (SOEP) from the initial wave in 1984 to 2015. The SOEP is a nationally representative panel study for which data are collected annually from households across Germany. We refer the reader to Wagner et al. (2007) and Wagner et al. (2008) for a comprehensive overview. We include all available subsamples, except for the East German sample because most of the immigrants in our dataset were settled in West Germany during the sample period – only 2.3% of immigrant observations in our pooled data reside in East Germany – partly because a substantial number of immigrants arrived before German reunification and economic opportunities were generally better in West Germany after reunification. Moreover, SWB differed substantially between East and West Germans after reunification (e.g., Easterlin and Plagnol, 2008) and it is therefore more sensible to compare the SWB of immigrants to that of their West German neighbours. We include only observations aged 18 to 65 as the number of migrants at older ages is fairly small, possible due to return-migration to their native countries (e.g., Yahirun, 2014). In West Germany, 21.2% of observations in our pooled data in the 18 to 65 age range are immigrants, whereas the fraction of immigrants among those older than 65 is only 9.3%. Our final sample contains 326,413 person-year observations from 49,102 respondents.

The following question is included in every wave: "How satisfied are you at present with your life as a whole?", and respondents are asked to rate their response on a scale from 0 to 10, with 0 denoting the lowest and 10 the highest level of LS. We include in our analysis

all observations which have non-missing values for the LS question and all independent variables that we use in our model. Migrants are identified based on a classification provided by the survey institute: the variable "migback" (migration background) which distinguishes between four types of migration background based on the respondent's nationality, migration history and parental information. We include an indicator variable for immigration status, equal to 1 if the respondent is classified as someone with a direct migration background, i.e. born outside of Germany. We do not distinguish between second generation migrants who were born in Germany to foreign-born parents (indirect migration background) and native Germans (no migration background) because our analysis focuses on changes in LS *since migration*, which is only relevant for those with a direct migration background. Our key independent variable measures the years that have passed since migration (YSM), defined as the survey year minus the year of immigration for immigrants, and set to 0 for natives.[5]

The immigrants in our sample mostly migrated from the former Soviet Union (20%), Turkey (17%), the former Yugoslavia (11%), Poland (9%), Italy (7%), Greece (5%), and Spain (4%). We group Spain, Greece, and Italy into one category (Mediterranean) in our descriptive analysis because of relatively small sample sizes. Other immigrants arrived from France, Austria, Romania, and Middle Eastern countries but their numbers are small and we therefore group them in a separate category of 'other immigrants'.

The main health variable that we include denotes the number of nights that the respondent spent in hospital in the previous year, for the simple reason that it is available in almost all survey years, but we also repeat the main regressions with a number of alternative health variables, such as whether the respondent was hindered in their daily activities by their health, the absence of recent visits to the doctor and SF-12-based measures of physical and

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[5] Note that this variable is also 0 for immigrants who arrived less than a year before the survey date. Those immigrants are distinguished from natives by inclusion of an immigrant dummy.

mental health. Here, 'physical health' and 'mental health' are composed of answers to a battery of questions and range between 0 and 100. Their construction is discussed in Andersen, Mühlbacher, Nübling, Schupp, & Wagner (2007) and we briefly describe them in Appendix A.

We include as further control variables age in years, age squared divided by 100, a dummy variable for males, living with a partner (spouse or cohabiting), years of education, the log of equivalised household income,[6] having children in the household, and several indicators of employment status (employed, unemployed; omitted category = not in the labour force). Table 1 shows the descriptive statistics of the pooled sample separately for natives and immigrants.

Table 1: Descriptive statistics - Averages for natives and immigrants

	Immigrants	Natives	Difference*
Life satisfaction (LS) (0-10)	7.08	7.21	-0.13
Years since migration (YSM)	19.5	--	--
Age	41.4	41.6	-0.2
Male (%)	49.2	47.7	1.5
Living with a partner (%)	81	71	10
Education (years)	10.4	12.2	-1.8
Ln(household income)	6.62	6.93	-0.31
Nights in hospital	1.6	1.3	0.3
Has children in household (%)	59	43	16
Employed (%)	68	75	-7
Unemployed (%)	8.6	4.2	4.4
Not in labour force (%)	23	21	2

Note: * All differences in the third column are significant at the 5% level. N_{im} = 62,718, N_{nat} = 263,695.

We see that important differences between natives and immigrants exist in all dimensions: immigrants are significantly less satisfied, younger, more likely to be male, more likely to be living with a partner, less educated, have less income, less healthy, more likely to have children in the household, less likely to be employed, and more likely to be unemployed. These differences in sample characteristics likely reflect selection into migration and circumstances in the migrants' countries of origin.

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[6] We use the OECD equivalence scale. The first adult person is counted fully, every other person in the household above the age of 14 with 0.7, and any further household member with 0.5.

3. Analytical strategy

We first provide a descriptive analysis of the LS trajectories of natives and immigrants in the SOEP sample. We then estimate models of LS applying pooled OLS, fixed effects, and ordered logit estimators. The first two assume cardinality of LS. The fixed effects estimator allows for time-invariant unobserved heterogeneity which might correlate with the independent variables. We also estimate a fixed effects ordered logit model, which combines both the non-cardinality and the unobserved heterogeneity of the ordered logit and the fixed effects model. The method has been labelled 'blow-up and cluster' by Baetschmann et al. (2015) and is based on a dichotomisation of LS at every possible cut-off point and applying the conditional logit of Chamberlain (1980) to the dichotomised dependent variable. We briefly describe the method in appendix B and refer the reader to Mukherjee et al. (2008) and Baetschmann et al. (2015) for a detailed discussion of this estimator. All regressions include a full set of year fixed effects.

4. Results

The aim of our analysis is to test a number of possible explanations for the YSM effect, which has been observed in previous studies. We begin the analysis with presenting basic findings on the LS trajectories in the SOEP covering the survey years 1984 to 2015. LS changes over time are clearly related to age and we therefore start our analysis by depicting the age - LS profiles of natives and immigrants in the pooled data (Figure 1). We see that young immigrants are, more or less, as satisfied as natives. However, the LS of immigrants older than 33 is consistently below that of natives, and this distance suddenly increases for observations in their 50s – all the differences in LS between age 51 to 65 are significant at the 1% level. We also see the well-being U-pattern in age that has been documented in several previous studies (e.g.; Blanchflower & Oswald, 2008; Frijters, Haisken-DeNew, & Shields,

2004); at least for native Germans as the LS increase at older ages is less pronounced for immigrants.

Figure 1: Age - life satisfaction profiles for natives and immigrants
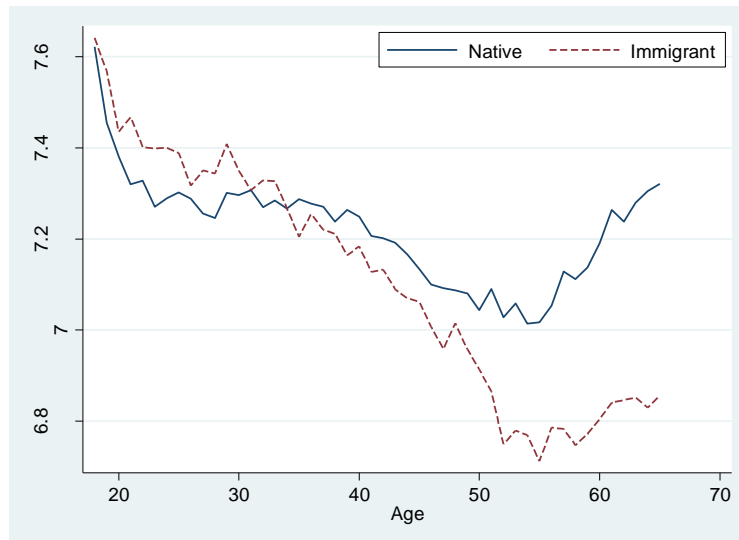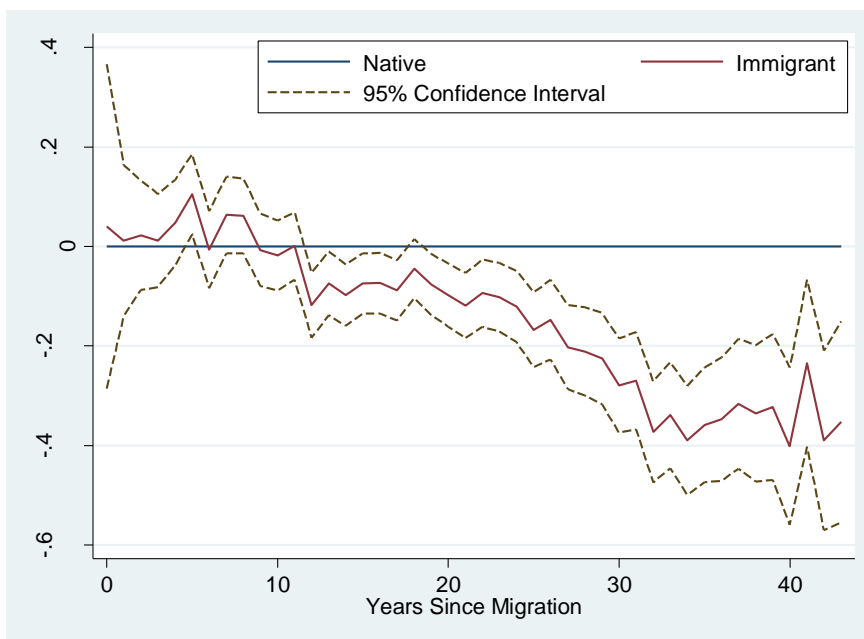

Note: The figure depicts mean life satisfaction by age for natives and immigrants.

Figure 1 does not necessarily imply that immigrants who have been living in Germany for a longer time are increasingly becoming less satisfied. Immigrants who arrived in Germany later in life might have already been less satisfied at arrival. However, Figure 2 reveals that this pattern is indeed related to years since migration. The graph depicts the mean LS of immigrants compared to a sample of same-aged natives in the same survey year. In other words, it depicts the YSM coefficients (plus the immigrant coefficient) in a regression of LS on an immigrant dummy, a full set of YSM dummies, a full set of age dummies, and a full set of year dummies. The graph mimics the pattern depicted in Figure 1. We conclude that immigrants who have been living in Germany for a longer time are genuinely less satisfied than their native peers, and this gap is increasing with YSM. Figure 3 shows that this pattern is not uniform across all immigrant groups. The YSM effect is most pronounced

among Turkish and Yugoslavian immigrants, and weakly present among immigrants from the main Mediterranean countries (Spain, Greece, and Italy).[7]

The graphical analysis cannot rule out the presence of confounding factors or that the YSM effect is a cohort effect; that is, immigrants who arrived a long time ago in Germany were already less satisfied than their native peers at their arrival, whereas those who arrived recently have satisfaction levels comparable to those of natives. The ensuing regression analyses demonstrate that the YSM effect truly reflects a within-individual rather than between-individual effect and that it is robust to the inclusion of control variables.

Figure 2: Years since migration (YSM) - life satisfaction profile for immigrants (natives' life satisfaction as baseline)

Note: The figure depicts the value of the immigrant coefficient plus the coefficients of the YSM dummies in a regression of life satisfaction on year fixed effects, a full set of age dummies, an immigrant dummy and a full set of YSM dummies.

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[7] For immigrants from Poland, the former Soviet Union, and other countries of origin, there appears to be no YSM effect.

Figure 3: Years since migration (YSM) - life satisfaction profiles, by immigrants' country of origin
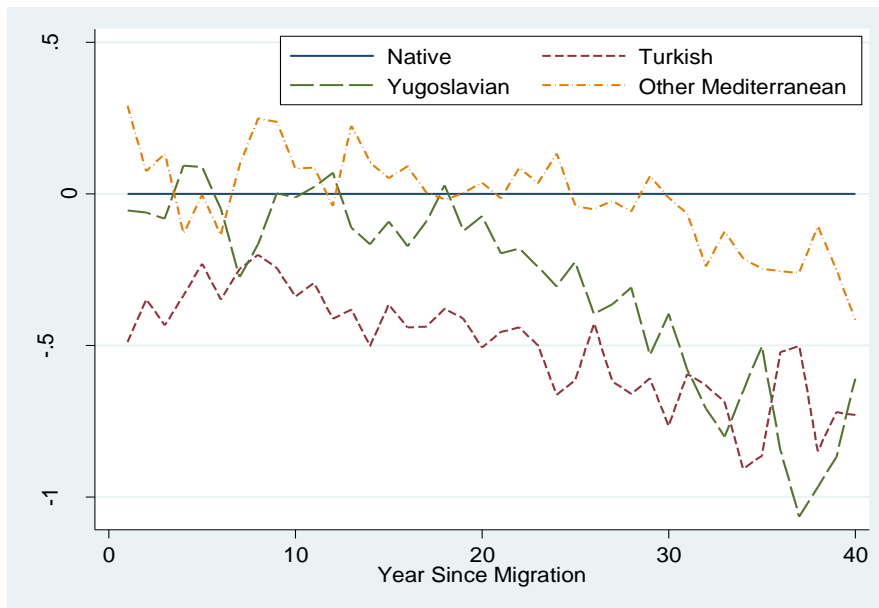
Note: The figure depicts the value of the immigrant group coefficient plus the coefficients of the YSM dummies of that immigrant group in a regression of life satisfaction on year fixed effects, a full set of age dummies, immigrant group dummies and a full set of immigrant group specific YSM dummies.

Table 2: Determinants of life satisfaction – SOEP 1984 to 2015

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Pooled OLS		Fixed Effects (FE)		Ordered Logit		FE Ordered Logit	
Immigrant	0.073***	0.226***			0.070**	0.239***		
	(0.016)	(0.016)			(0.017)	(0.017)		
Years since migration	-0.010***	-0.008***	-0.011***	-0.008***	-0.010***	-0.009***	-0.012***	-0.008**
(YSM)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)
Age	-0.030***	-0.111***	0.104***	0.053***	-0.034***	-0.119***	-0.049***	-0.108***
	(0.002)	(0.002)	(0.017)	(0.017)	(0.002)	(0.002)	(0.006)	(0.006)
Age2/100	0.028***	0.119***	0.004	0.050***	0.032***	0.128***	0.009	0.070***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.006)	(0.007)
Male		-0.075***				-0.090***		
		(0.006)				(0.006)		
Living with partner		0.455***		0.330***		0.461***		0.447***
		(0.008)		(0.011)		(0.008)		(0.025)
Ln(HH income)		0.600***		0.368***		0.639***		0.521***
		(0.007)		(0.009)		(0.008)		(0.019)
Nights in hospital		-0.020***		-0.010***		-0.019***		-0.012***
		(0.000)		(0.000)		(0.000)		(0.001)
Children in HH		0.268***		0.120***		0.295***		0.159***
		(0.007)		(0.009)		(0.008)		(0.019)
Employed		0.116***		0.108*		0.081***		0.147***
		(0.008)		(0.009)		(0.009)		(0.018)
Unemployed		-0.839***		-0.536***		-0.825***		-0.636***
		(0.015)		(0.015)		(0.016)		(0.028)
Education (in years)		0.022***				0.026***		
		(0.001)				(0.001)		
Observations	326,413	326,413	326,413	326,413	326,413	326,413	326,413	326,413
Number of persons			49,102	49,102			49,102	49,102
(Pseudo) R-squared	0.011	0.088	0.019	0.041	0.003	0.023	0.016	0.032

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The R-squared for the fixed effects models in columns 3 and 4 are squared correlations between the de-meaned life satisfaction and predicted de-meaned life satisfaction from the fixed effects estimation. Stata reports this measure as R-squared within. The omitted category for employment status is 'not in the labour force'.

Before turning to a more in-depth analysis of possible explanations for the YSM effect, we first run standard LS regressions on our sample of immigrants and German natives, applying pooled OLS, fixed effects, and ordered logit estimators (Table 2). We observe that, on average, recently arrived immigrants report higher levels of LS than similar natives as reflected in the significant, positive coefficient for the immigrant dummy in the regressions that include socio-demographic control variables (columns 2 and 6). However, every additional year in Germany is associated with a reduction in LS for immigrants, implying that immigrants' LS decreases compared to natives with the duration of their stay in Germany. The results from the fixed effects regressions (columns 3, 4, and 7, 8) demonstrate that this is a genuine YSM effect rather than a composition effect. The OLS and fixed effects results are similar to the ordered logit results. The remaining coefficients suggest associations between sample characteristics and LS as expected. Living with a partner, having more income, better health, (not) being (un)employed, and having children are significantly associated with higher LS. Women are more satisfied than men. Close to 9% of the variation in LS is explained by the best-fitting model (column 2), a typical number for LS regressions (e.g., Diener et al., 1999). The effect of YSM on LS is significant, but modest in absolute value. This is apparent when we standardise LS: including all controls, an additional 10 years in Germany implies a decrease in LS of only 4.5% of a standard deviation in LS (fixed effects), and a recently arrived immigrant is 13% of a standard deviation more satisfied than an otherwise comparable native (pooled OLS). We also estimated a model including YSM squared. This did not change the linear YSM coefficient and did not significantly improve model fit, so we proceed with models linear in YSM.

We take a closer look at six possible explanations for the negative YSM effect. We first investigate whether the YSM - LS association is stable over time and whether it is driven by the effects of non-random sample attrition. We then analyse whether the degree of an

immigrant's integration and the permanence of their stay in Germany can explain the YSM effect. We further analyse potential differences in the YSM effect across ethnicities before we investigate the potential role of immigrants' declining health over time. Finally, we consider the possibility of response shifts in reporting LS over time.

4.1 Stability over time

In a year-by-year OLS estimation we find that the negative effect of YSM and the positive immigrant coefficient are stable only after 1992 (see Figures 4 and 5). The explanatory power of the model is much stronger in the later third of the panel, and weaker in the first few waves (not reported). Running fixed effects regressions on different time periods reveals that there is positive relationship in the first four survey years. Indeed, the YSM coefficient's p-value is just above 0.10, suggesting, if anything, a positive relationship of years since migration and LS in the early years of the panel. The negative effect is most pronounced in the transformative years of 1988 to 1992 which saw the fall of the Berlin wall and German reunification but also a rise in racist violence and rhetoric against immigrants and their descendants. We emphasise that the reversal of the YSM effect is not a result of new immigrants arriving in Germany, as the sample of immigrants over these years in the SOEP is fairly stable.

Figure 4: YSM coefficients by year
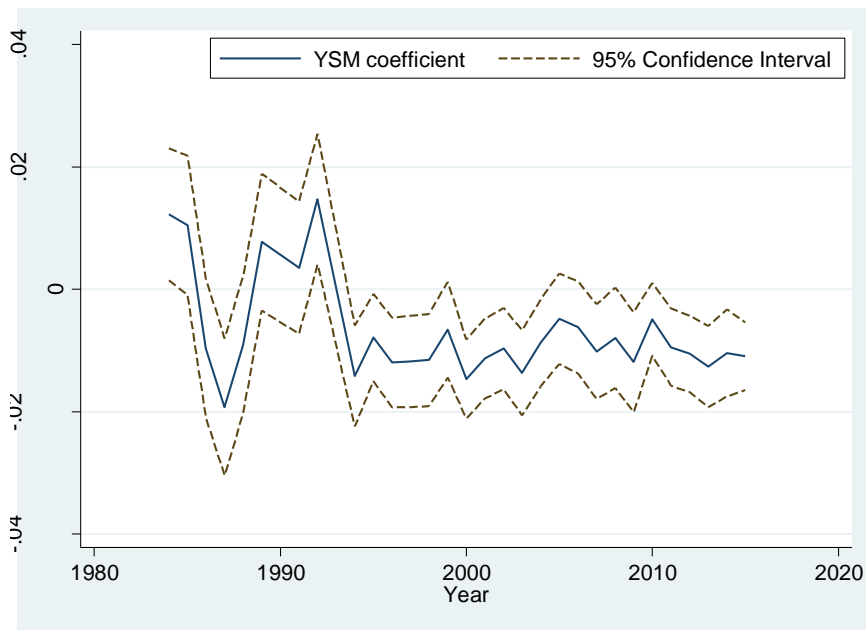
Note: The figure depicts the YSM coefficient for separate year-by-year regressions of life satisfaction on the same independent variables as in Table 2.

Figure 5: Immigrant coefficients by year
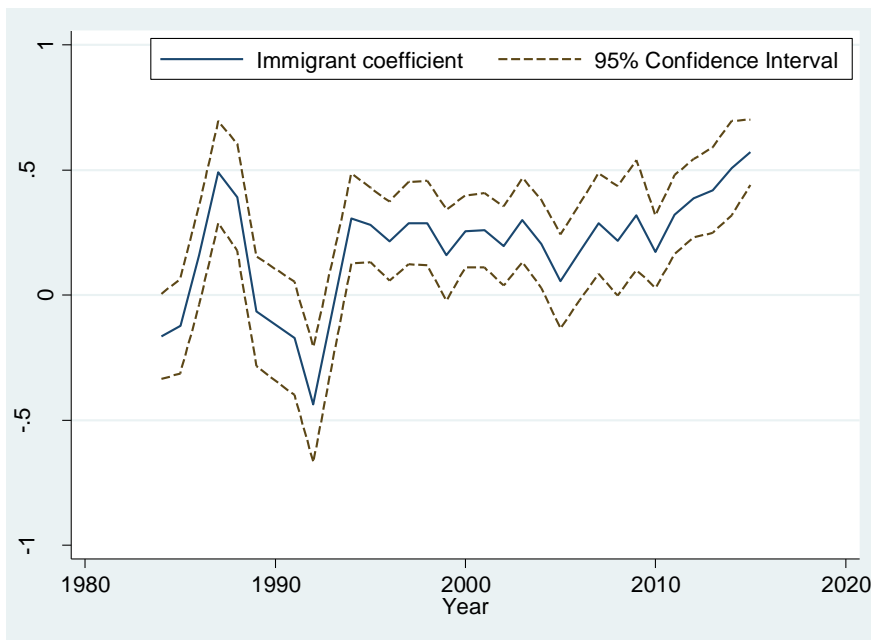
Note: The figure depicts the immigrant coefficient for separate year-by-year regressions of life satisfaction on the same independent variables as in Table 2.

4.2 Attrition

In a first step, we analyse the factors predicting the probability of dropping out of the survey. By estimating a Weibull attrition hazard model (Table 3). The first column reveals that immigrants are more likely to drop out of the survey, undoubtedly due to non-negligible return or repeat migration (e.g., Constant and Zimmermann, 2012). We find that immigrants who have been in Germany longer are less likely to attrite. Adding LS as a variable also shows that the less satisfied are more likely to drop out (column 2). However, including an interaction term (column 3) reveals that less satisfied immigrants are even more likely to drop out. If anything, this should bias the YSM coefficient towards zero, since less satisfied immigrants who have been living in Germany for a longer time will be underrepresented in our sample.

Table 3: Weibull attrition hazard models

	Weibull duration model		
	(1)	(2)	(3)
Immigrant	0.260***	0.263***	0.373***
	(0.028)	(0.028)	(0.058)
Years since migration	-0.007***	-0.007***	-0.007***
	(0.001)	(0.001)	(0.001)
Life satisfaction (LS)		-0.021***	-0.18***
		(0.003)	(0.004)
LS x Immigrant			-0.015**
			(0.007)
Observations	326,413	326,413	326,413

Standard errors in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Other controls as in Table 2. Full table of results available upon request.

Next we test for non-random attrition in a fixed effects model of LS by including a dummy in our benchmark regression which is equal to one if the respondent is not in the sample in the following year (as suggested in Wooldridge, 2002, pp. 586–587). Respondents who are going to attrite in the next survey wave are less satisfied (Table 4, column 1), echoing the result from the hazard model. Column 2 further shows that this effect is not significantly different between immigrants and natives: an immigrant who will attrite is only

marginally more satisfied than a native who is going to attrite. To correct for potential attrition bias we again follow the steps in Wooldridge (2002): we run a probit regression of whether the respondent will attrite in the next survey wave on the current values of all independent variables separately for each year. We then construct predicted inverse Mills ratios λ_{it} (based on variable values in t-1) which we include along with interactions with all year dummies in a fixed effects model. A loose but intuitive interpretation is that the λs proxy the probability that the respondent will attrite in the next period. Column 3 of Table 4 shows the results from this attrition-corrected model. The YSM effect is slightly above the benchmark result. The YSM effect is thus not driven by any systematic attrition difference between natives and immigrants or within the immigrant sample.

Table 4: Non-random attrition models

	(1)	(2)	(3)
			Fixed-effects with inverse
	Fixed-effects	Fixed-effects	Mills-ratios
Years since migration	-0.008***	-0.008***	-0.011***
	(0.001)	(0.001)	(0.003)
Attrition	-0.105***	-0.109***	
	(0.010)	(0.011)	
Attrition x Immigrant		0.020	
		(0.023)	
Observations	311,795	311,795	253,096
Number of persons	46,288	46,288	38,257
R-squared	0.043	0.043	0.036

Dependent variable: life satisfaction. Other controls as in Table 2. Full table of results available upon request. Standard errors in parentheses; standard errors in column three are bootstrapped from 500 replications. *** p<0.01, ** p<0.05, * p<0.1. The last year of the panel is excluded, as the Attrition variable for that year is not defined. The R-squared for the fixed effects models are squared correlations between the de-meaned life satisfaction and predicted de-meaned life satisfaction from the fixed effects estimation. Stata reports this measure as R-squared within.

4.3 Integration in German society

We next analyse how the YSM effect changes when we include variables related to how well integrated immigrants are in German society and in which country they see their future. Kóczán (2013) finds that immigrants' LS is no different from natives' once a variable indicating whether the respondent works in a job he was trained in is controlled for.

However, the YSM coefficient is not affected by inclusion of this variable in our analysis (Table 5, column 1). Moreover, inclusion of self-assessed speaking fluency of German and one's native language does not affect the YSM coefficient[8] (Table 5, column 2). Including a dummy for the intention to stay in Germany forever reduces the YSM coefficient slightly compared to the 0.008 benchmark value. Still, the YSM coefficient remains significant.

Table 5: Life satisfaction and integration in German society

	(1) Fixed effects (full sample)	(2) Pooled OLS (immigrant sample)	(3) Pooled OLS (immigrant sample)
Years since migration	-0.006***	-0.012***	-0.007***
	(0.002)	(0.002)	(0.001)
Employed	0.068	0.206***	0.296***
	(0.043)	(0.035)	(0.022)
Unemployed		-0.794***	-0.609***
		(0.054)	(0.033)
Education		-0.014**	0.008**
		(0.007)	(0.004)
German skill		0.204***	
		(0.015)	
Native language skill		0.087***	
		(0.019)	
Works in occupation	-0.019***		
	(0.006)		
Wants to stay in Germany			0.321***
			(0.018)
Observations	227,214	21,749	47,902
Number of persons	39,055		
R-squared	0.029	0.090	0.105

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Other controls as in Table 2. Full table of results available upon request. The R-squared for the fixed effects models are squared correlations between the de-meaned life satisfaction and predicted de-meaned life satisfaction from the fixed effects estimation. Stata reports this measure as R-squared within.

4.4 Ethnic background

We next check whether there are important differences across ethnicities. We run fixed effects regressions on separate immigrant samples, excluding the survey years 1984 to 1987 because there is no negative YSM effect in these years.[9] To be able to identify separate age

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[8] The language variables are only available for the immigrant sample.

[9] Full table of results available upon request.

and YSM effects we also include natives in each regression. The negative YSM effect is most pronounced for immigrants from the former Yugoslavia (-0.018***) and from the Mediterranean countries other than Turkey (-0.018***). For immigrants from Yugoslavia this could reflect the effect of war as an external shock that occurred in the early 1990s and considerably affected their subjective well-being (e.g., Shemyakina and Plagnol, 2012): the violence in their home countries might have reduced the LS of Yugoslavians over and above any age and proper YSM effect. However, this cannot explain the strong effect found for immigrants from other Mediterranean countries. Turks start out with lower levels of LS (see also Figure 3) which explains the slow decrease over time (-0.006**). There is no clear effect for immigrants from other countries (-0.001), perhaps because most of them migrated from the former Soviet Union, Poland, and Romania, and are likely to be ethnic Germans or descendants of Germans.

4.5 Health

To assess health, we use nights spent in hospital in our benchmark model (Table 2) because of the availability of this variable in most survey years. The use of alternative health measures reduces our sample size and thus comes with the disadvantage of analysing different subsamples for each variable included in the analysis.

First, we observe that the inclusion of alternative health-related variables does not affect the significance of any coefficient but the one for YSM (Table 6). The size and significance of the YSM coefficient is only preserved when we use a dummy indicating whether the respondent is hindered in their daily activities by their health (column 1), and when we use a dummy indicating whether the respondent has not been to a doctor in the last year (column 2). The YSM is no longer significant with the inclusion of a measure of chronic illness (column 3), possibly because this variable is only available in the 1980s and the negative YSM effect appears only beginning in the late 1980s/early 1990s.

Table 6: Life satisfaction and health-related measures (fixed effects regressions)

	Fixed effects					
	(1)	(2)	(3)	(4)	(5)	(6)
Years since migration	-0.008***	-0.007***	0.001	0.002	0.002	0.004
	(0.002)	(0.001)	(0.007)	(0.002)	(0.004)	(0.004)
Hindered by health	-0.517***					
	(0.011)					
No doctor visits		0.118***				
		(0.006)				
Chronic illness			-0.325***			
			(0.022)			
Self-Assessed Health				0.482***		
				(0.004)		
Physical health					0.020***	
					(0.001)	
Mental health						0.054***
						(0.001)
Observations	110,500	325,427	57,805	266,492	79,326	79,325
Number of persons	24,951	49,076	13,069	43,678	27,624	27,624
R-squared	0.064	0.040	0.032	0.093	0.034	0.129

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Other controls as in Table 2. Full table of results available upon request. The R-squared for the fixed effects models are squared correlations between the de-meaned life satisfaction and predicted de-meaned life satisfaction from the fixed effects estimation. Stata reports this measure as R-squared within. Inclusion of the health variables in the survey: Hindered by health (1984-1987; 1992; 1995-2001), no doctor visits (1984-2015), chronic illness (1984-1991), self-assessed health (1992-2015), physical health and mental health (2002-2014, every other year).

We further observe that health variables that are closely related to self-assessed perceptions of health (e.g. self-reported health, SF-12-based measures of physical and mental health) explain more of the variation in LS than other health measures, and result in a positive albeit insignificant YSM coefficient (columns 4, 5 and 6). Self-assessed health and LS are both psychological constructs[10], and individuals' assessments of both may therefore depend on the same individual characteristics. How self-assessed health and LS are related to each other has generated an intense debate in recent years with a focus on specific patient cohorts (see Brazier and Tsuchiya, 2015). Less is known about the potential relationship between health and LS for other socio-demographic groups such as immigrants. Our observation is that controlling for subjective health measures reduces the YSM effect to statistical non-significance. One explanation of this is causal: immigrants' health declines, and therefore so

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[10] I.e. not directly observable, non-tangible, and subjective.

does their LS. Alternatively, immigrants' perception of their health changes (without an underlying change in their health status), and this correlates with a change in the immigrants' perception of their LS. Thus, subjective health measures are more likely to be endogenous. We therefore prefer the models that use objective health measures, such as the number of recent doctor visits.

4.6 Changes in the perception of life satisfaction

In a final step, we consider the possibility that people's internal LS rating scales might shift over the life course. For immigrants, such a response shift might be related to assimilation to the host country over time (and thus years since migration). The common approach to manage rating scales is based on the assumption of a latent, unobserved variable, which is converted into a particular category by the respondent, following a threshold partition. The literature has been aware of potential response heterogeneity (i.e. different individuals using different thresholds). Recent contributions have developed consistent and/or efficient estimators for ordered logit, which are all based on a dichotomisation of the dependent variable and the application of Chamberlain's (1980) conditional logit model (as in Baetschmann et al., 2015; Ferrer-i-Carbonell and Frijters, 2004; Mukherjee et al., 2008).

All of these applications have assumed that the thresholds that divide one category from the other are fixed over time (but not necessarily across individuals). That is, for a particular latent value of LS, the individual will report the same category regardless of the year of the survey. This assumption is necessary in ordered choice models since the effect of an independent variable on the level of the latent variable cannot be separately identified from the independent variable's effect on the level of the thresholds. If thresholds do change systematically with observed variables, then the coefficient estimates in the aforementioned models are not effects on the level of the latent variable, but rather on the level change of the

latent variable relative to threshold locations (which might have changed themselves), and thus contain very little information, as even the sign cannot be interpreted in its effect on the latent variable.

The existence of a response-shift has been frequently found in the reporting behaviour linked to subjective psychological constructs (e.g., Schwartz et al., 2013). In the context of the LS of immigrants, several papers point in that direction. Gelatt (2013) finds that immigrants change their reference group after some years of living in the host country: they shift from comparing themselves to those staying in their country of origin to comparing themselves to other immigrants and/or natives in the host country. Angelini, Casi, & Corazzini (2015) explore how cultural assimilation may impact immigrants' LS, and it is possible that adaptation to another culture may affect internal LS rating scales. In both scenarios, it is plausible that immigrants may not be changing their actual level of LS but instead simply experience a shift in the thresholds which determine their responses.

We take a closer look at such a potential response shift and introduce an innovative approach to decompose the coefficients for two variables – YSM and satisfaction with one's health – from a fixed effects ordered logit regression into a part which shifts the latent variable (the "true" LS) and another part which shifts the thresholds to qualify a given level of LS into one of the answer categories (an integer between 0 and 10), as in Cubi-Molla & Yaman (2015). To do this, we first estimate the LS model with the blow-up and cluster estimator (as in Table 2, columns 7 and 8), but restrict the sample years to 1984 to 1987. This narrower time bracket is unfortunate in that this particular time period is rather atypical in exhibiting a positive YSM effect, but necessary as we want to exploit the question about recalled LS in the previous year, which was asked uniquely in these four years. Note that this is not a lagged LS variable, but rather how the respondent would (today) rate his or her LS in the previous year. Respondents rate their past LS on a scale from 0 to 10. We thus apply a

latent variable formulation to this variable. Finally, we follow the model by Easterlin (2001) in assuming that respondents apply their current thresholds to assess both their current and their past LS: a choice that is supported by the fact that the question about past LS is asked right after the question about current LS. The data on recalled and lagged LS is consistent with such a modelling choice (Table 7). The table contrasts the recalled LS (columns) with the LS that was reported in the previous year (rows). Under perfect recall and stable reporting behaviour one would observe all responses only in the diagonal cell entries (100 percent). However, we see that most cases do not fall into these cells. Only 29% of the observations report a recalled level of LS that coincides with what they had reported in the previous year, while 30% report recalled levels above, and 41% report recalled levels below the LS level they had reported in the previous year.

Table 7: Reported and recalled life satisfaction

| | Life satisfaction for year t-1 recalled in year t | | | | | | | | | | | |
	0	1	2	3	4	5	6	7	8	9	10	Total
0	24	10	13	28	27	42	15	17	16	4	2	198
1	10	8	12	12	12	20	8	5	15	5	2	109
2	8	14	15	31	32	74	26	23	19	6	7	255
3	18	11	24	57	70	111	77	59	49	19	10	505
4	13	13	32	69	71	161	107	94	59	23	11	653
5	43	17	79	145	229	723	430	490	413	116	102	2,787
6	13	6	26	72	132	367	351	496	389	118	76	2,046
7	13	13	30	61	139	511	606	1,152	1,080	296	171	4,072
8	18	7	34	68	108	524	556	1,416	2,324	818	425	6,298
9	4	6	7	28	36	162	189	480	1,041	816	344	3,113
10	11	7	13	23	47	184	142	329	848	657	1,194	3,455
Total	175	112	285	594	903	2,879	2,507	4,561	6,253	2,878	2,344	23,491

(Rows: Life satisfaction as reported in year t-1)

We have thus the following building blocks for our model. The current latent LS is given by

$$y_{it}^* = \beta_0' x_{it} + \beta_1 YSM_{it} + \beta_2 HS_{it} + a_i + \varepsilon_{it} \tag{1}$$

where YSM_{it} denotes years since migration, HS_{it} is satisfaction with health, x_{it} is a vector of other control variables, a_i is an individual fixed effect, and ε_{it} is an independent and transitory error term (say, the mood of the person on the survey day) following a logistic distribution with scale parameter 1. The previous LS, remembered from the present, is given by

$$y_{it}^{t-1,*} = \delta_0\big(y_{i,t-1}^* - \varepsilon_{i,t-1}\big) + \delta_1 y_{it}^* + \tilde{u}_{it} \tag{2}$$

The first part of this reconstructed / recalled LS is based on the actual non-random LS that the respondent felt in the previous year (given by equation (1) less the random term). The parameter δ_0 allows for an attenuated (or possibly amplified) effect of this on how the respondent remembers her past LS. The second term allows for the recall to be affected by current LS which is a function of current circumstances x_{it}. The psychological literature argues that the present bears heavily on people's memories of events and of their feelings (cf. Gilbert, 2006, in particular chapter 6; or O'Brien et al., 2012; Pudney, 2011). Finally, we also include an independent and transitory recall error $\tilde{u}_{it}$. The last building block is given by the threshold specification:

$$\lambda_{it}^k = \tau_i^k + \alpha_1 YSM_{it} + \alpha_2 HS_{it} \tag{3}$$

The thresholds are thus specific to individuals, but they are also allowed to vary over time with years since migration and with health satisfaction. Allowing for individual specific thresholds will also capture any scale differences that might exist due to cultural differences between immigrant groups. The derivation of the estimable model and a discussion on the identification of the coefficients can be found in appendix C.

We think it helpful to classify any variable which has an effect on both the latent variable and on the threshold into one of four mutually exclusive categories. Any variable which has a positive effect on the latent variable ($\beta > 0$) is a "good", and otherwise a "bad". A "good" or a "bad" is "reinforcing" if its effect on the threshold is in the opposite direction

(e.g. $\alpha < 0$ for a good), and "adaptive" if it is in the same direction. If a variable is adaptive, an individual might not change her reported LS category even if her LS changed in response to a change of the concerned variable. If a variable is reinforcing an individual would change her LS more dramatically in response to a change of the concerned variable than she would have anticipated. To give an example, wealth might be a candidate for an adaptive good: more wealth increases satisfaction, but pushes out the thresholds for classifying oneself as wealthy. Table 8 summarises the classification of a variable according to the sign of β and α.

Table 8: Classification of variables

	$\beta < 0$	$\beta > 0$
$\alpha < 0$	adaptive bad	reinforcing good
$\alpha > 0$	reinforcing bad	adaptive good

We present the results from the threshold model in Table 9, which contains the raw estimates, and Table 10, which contains the implied structural parameter estimates. The $\beta_1 - \alpha_1$ coefficient is 0.052, implying increasing reported LS with years since migration. Satisfaction with health is also positively associated with LS. All other coefficients have the usual and expected signs, maybe with the exception of age squared. The estimates for δ_0 and δ_1 are also in a range we would expect. The past is remembered quite accurately albeit with attenuated intensity, and the present bears on the memory as well: currently more satisfied people report higher past satisfaction and vice versa. The ratio $\frac{\delta_0}{\delta_1}$ equals 1.8, thus past satisfaction is close to twice as relevant as current satisfaction in answering the question about past LS.

The decomposition of the YSM and health satisfaction coefficients suggest that threshold effects are quite important. The YSM effect on latent LS is actually negative and

substantial, but it is counterbalanced by an even stronger negative effect on LS thresholds: while immigrants' LS decreases, they are increasingly more likely to classify their LS higher even without an underlying change in their latent LS. This makes YSM an adaptive bad. Health satisfaction is a reinforcing good. It increases latent LS, and at the same time lowers the thresholds for people to classify themselves in high levels of LS.

Table 9: Time-variant thresholds

	Coefficient
Years since migration	0.052**
	(0.025)
Age	-0.153***
	(0.038)
Age2/100	-0.046
	(0.045)
Living with partner	0.611***
	(0.099)
Ln(HH income)	0.380***
	(0.057)
Nights in hospital	0.000
	(0.001)
Children in HH	0.065
	(0.067)
Employed	0.238***
	(0.064)
Unemployed	-0.653***
	(0.091)
Satisfaction with health	0.286***
	(0.009)
δ_0/σ	0.562***
	(0.069)
δ_1/σ	0.311***
	(0.076)
$\dfrac{\beta_1(\delta_0 + \delta_1) - \alpha_1}{\sigma}$	0.077**
	(0.036)
$\dfrac{\delta_1(\beta_2 - \alpha_2)}{\sigma}$	0.198***
	(0.012)
$\dfrac{\delta_0}{\sigma}\beta_2$	0.055***
	(0.011)
Observations	23,491
Persons	9,425

Standard errors in parentheses. Standard errors for the second stage estimates (lower panel) are bootstrapped from 500 replications. *** p<0.01, ** p<0.05, * p<0.1

Table 10: Time-variant thresholds

Parameter	Description	Estimate
δ_0	Effect of past LS on memory of past LS	0.500
δ_1	Effect of current LS on memory of past LS	0.277
σ	Scale parameter of error in equation 5	1.125
β_1	Effect of YSM on latent life satisfaction	-1.945
β_2	Effect of HS on latent life satisfaction	0.098
α_1	Effect of YSM on thresholds	-1.997
α_2	Effect of HS on thresholds	-0.188

Parameters are implied from estimates in Table 9.

5. Discussion and conclusion

We analysed the average pattern of life satisfaction (LS) of immigrants in Germany with attention to how it changes over the course of their stay in the host country. We found that shortly after arrival immigrants report higher levels of LS than natives but that their LS decreases relative to comparable natives over time. Thus, there is a negative YSM effect. The magnitude of the effect is small, but it is statistically robust. Furthermore, it does not depend on the use of cardinal or ordinal models and increases when we use fixed effects models.

We considered six explanations for the YSM effect. Sample attrition seemed a natural candidate to explain the YSM effect, but we saw that while systematic differences in attrition behaviour exist between natives and immigrants, and between satisfied and dissatisfied people, satisfied immigrants are not more or less likely to attrite than satisfied natives once we control for immigration status and LS. Correcting for attrition bias actually increases the YSM coefficient somewhat. Inclusion of other variables to proxy for immigrants' integration or the permanence of their stay in Germany did not alter our YSM finding either. Ethnic background, on the other hand, is an important factor. We find no YSM effect for immigrants from the former Soviet Union and from Poland, and the strongest effect for immigrants from the former Yugoslavia. Inclusion of different measures of health did not change the YSM

effect when the measure was based on objective assessments of their health, but was reduced to zero otherwise.

We proposed and estimated an innovative model that allows to decompose the YSM and health effects on LS into an effect on latent LS and an effect on the thresholds applied to categorise this latent LS. In our model, individuals reconstruct and evaluate their past LS. We showed that both YSM and health satisfaction have sizeable effects on "true" LS and on the thresholds to categorise their LS (their reporting behaviour). We categorised YSM as an adaptive bad and health satisfaction as a reinforcing good. We believe that more research on how, and how accurately, people can recall past events and states will enrich the field of LS research and might hold the key to identifying changes in the latent variable from changes in category thresholds.

Overall, the present analysis contributes to our understanding of immigrants' LS after migration. This is of important policy concern as their LS may to some extent reflect the success or failure of integrating immigrants in host societies.

References

Akay, A., Constant, A. and Giulietti, C. (2014) 'The impact of immigration on the well-being of natives', *Journal of Economic Behavior & Organization*, 103, pp. 72–92. doi: 10.1016/j.jebo.2014.03.024.

Amit, K. and Bar-Lev, S. (2015) 'Immigrants' sense of belonging to the host country: The role of life satisfaction, language proficiency, and religious motives', *Social Indicators Research*. Springer Netherlands, 124(3), pp. 947–961. doi: 10.1007/s11205-014-0823-3.

Ananda, P., Krishnakumarb, J. and Tran, N. B. (2011) 'Measuring welfare: Latent variable models for happiness and capabilities in the presence of unobservable heterogeneity', *Journal of Public Economics*, 95(3), pp. 205–215. doi: 10.1016/j.jpubeco.2010.11.007.

Andersen, H. H. *et al.* (2007) 'Computation of standard values for physical and mental health scale scores using the SOEP version of SF-12v2', *Schmollers Jahrbuch*, 127(1), pp. 171–182.

Angelini, V., Casi, L. and Corazzini, L. (2015a) 'Life satisfaction of immigrants: does cultural assimilation matter?', *Journal of Population Economics*. Springer Berlin Heidelberg, 28(3), pp. 817–844. doi: 10.1007/s00148-015-0552-1.

Angelini, V., Casi, L. and Corazzini, L. (2015b) 'Life satisfaction of immigrants: does cultural assimilation matter?', *Journal of Population Economics*. Springer Berlin Heidelberg, 28(3), pp. 817–844. doi: 10.1007/s00148-015-0552-1.

Arpino, B. and de Valk, H. (2017) 'Comparing life satisfaction of immigrants and natives across Europe: The role of social contacts', *Social Indicators Research*. Springer Netherlands, pp. 1–22. doi: 10.1007/s11205-017-1629-x.

Baetschmann, G., Staub, K. E. and Winkelmann, R. (2015) 'Consistent estimation of the fixed effects ordered logit model', *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, 178(3), pp. 685–703. doi: 10.1111/rssa.12090.

Bartram, D. (2011) 'Economic migration and happiness: Comparing immigrants' and natives' happiness gains from income', *Social Indicators Research*. Springer Netherlands, 103(1), pp. 57–76. doi: 10.1007/s11205-010-9696-2.

Bartram, D. (2013) 'Happiness and "economic migration": A comparison of Eastern European migrants and stayers', *Migration Studies*. Guilford Publications, New York, 1(2), pp. 156–175. doi: 10.1093/migration/mnt006.

Benjamin, D. J. *et al.* (2014) 'Can marginal rates of substitution be inferred from happiness

data? Evidence from residency choices', *American Economic Review*, 104(11), pp. 3498–3528. doi: 10.1257/aer.104.11.3498.

Bertrand, M. and Mullainathan, S. (2001) 'Do people mean what they say? Implications for subjective survey data', *American Economic Review*, 91(2), pp. 67–72. doi: 10.1257/aer.91.2.67.

Blanchflower, D. G. and Oswald, A. J. (2008) 'Is well-being U-shaped over the life cycle?', *Social Science & Medicine*, 66(8), pp. 1733–1749. doi: 10.1016/j.socscimed.2008.01.030.

Brazier, J. and Tsuchiya, A. (2015) 'Improving cross-sector comparisons: Going beyond the health-related QALY', *Applied Health Economics and Health Policy*, 13(6), pp. 557–565. doi: 10.1007/s40258-015-0194-1.

Büchel, F. and Frick, J. R. (2005) 'Immigrants' economic performance across Europe: Does immigration policy matter?', *Population Research and Policy Review*. Kluwer Academic Publishers, 24(2), pp. 175–212. doi: 10.1007/s11113-004-1370-4.

Chamberlain, G. (1980) 'Analysis of covariance with qualitative data', *The Review of Economic Studies*. Oxford University Press, 47(1), p. 225. doi: 10.2307/2297110.

Chiswick, B. R. (1978) 'The effect of Americanization on the earnings of foreign-born men', *Journal of Political Economy*. The University of Chicago Press, 86(5), pp. 897–921. doi: 10.1086/260717.

Clark, A. E. (2003) 'Unemployment as a social norm: Psychological evidence from panel data', *Journal of Labor Economics*. The University of Chicago Press, 21(2), pp. 323–351. doi: 10.1086/345560.

Constant, A. F., Gataullina, L. and Zimmermann, K. F. (2009) 'Ethnosizing immigrants', *Journal of Economic Behavior & Organization*, 69(3), pp. 274–287. doi: 10.1016/j.jebo.2008.10.005.

Constant, A. F. and Zimmermann, K. F. (2012) 'The dynamics of repeat migration: A Markov chain analysis', *International Migration Review*. Blackwell Publishing Ltd, 46(2), pp. 362–388. doi: 10.1111/j.1747-7379.2012.00890.x.

Cubi-Molla, P. and Yaman, F. (2015) *A fixed effects ordered choice model with flexible thresholds with an application to life-satisfaction*. 14/10.

D'Isanto, F., Fouskas, P. and Verde, M. (2016) 'Determinants of well-being among legal and

illegal immigrants: Evidence from South Italy', *Social Indicators Research*. Springer Netherlands, 126(3), pp. 1109–1141. doi: 10.1007/s11205-015-0924-7.

Danzer, A. M. and Yaman, F. (2013) 'Do ethnic enclaves impede immigrants' integration? Evidence from a quasi-experimental social-interaction approach', *Review of International Economics*, 21(2), pp. 311–325. doi: 10.1111/roie.12038.

Diener, E. *et al.* (1999) 'Subjective well-being: Three decades of progress', *Psychological Bulletin*, 125(2), pp. 276–302. doi: doi: 10.1037/0033-2909.125.2.276.

Diener, E., Oishi, S. and Lucas, R. E. (2003) 'Personality, culture, and subjective well-being: emotional and cognitive evaluations of life'. Annual Reviews 4139 El Camino Way, P.O. Box 10139, Palo Alto, CA 94303-0139, USA. Available at: http://0-www.annualreviews.org.wam.city.ac.uk/doi/abs/10.1146/annurev.psych.54.101601.145056 (Accessed: 19 May 2016).

Dolan, P., Layard, R. and Metcalfe, R. (2011) *Measuring subjective well-being for public policy*.

Dolan, P. and White, M. P. (2007) 'How can measures of subjective well-being be used to inform public policy?', *Perspectives on Psychological Science*, 2(1), pp. 71–85. doi: 10.1111/j.1745-6916.2007.00030.x.

Dorsett, R., Rienzo, C. and Weale, M. (2015) *Intergenerational and inter-ethnic well-being: An analysis for the UK, NIESR Discussion Paper 451*.

Dustmann, C. (1996) 'The social assimilation of immigrants', *Journal of Population Economics*. Springer, 9(1), pp. 37–54. doi: 10.2307/20007489.

Easterlin, R. A. (2001) 'Income and happiness: Towards a unified theory', *The Economic Journal*, 111(473), pp. 465–484. doi: 10.1111/1468-0297.00646.

Easterlin, R. A. and Plagnol, A. C. (2008) 'Life satisfaction and economic conditions in East and West Germany pre- and post-unification', *Journal of Economic Behavior & Organization*, 68(3–4), pp. 433–444. doi: 10.1016/j.jebo.2008.06.009.

Elkeles, T. and Seifert, W. (1996) 'Immigrants and health: Unemployment and health-risks of labour migrants in the Federal Republic of Germany, 1984–1992', *Social Science & Medicine*, 43(7), pp. 1035–1047. doi: 10.1016/0277-9536(96)00048-2.

Erlinghagen, M. (2011) 'Nowhere better than here? The subjective well-being of German

emigrants and remigrants', *Comparative Population Studies – Zeitschrift für Bevölkerungswissenschaft*, 36(4), pp. 899–926.

Farré, L. (2016) 'New evidence on the healthy immigrant effect', *Journal of Population Economics*. Springer Berlin Heidelberg, 29(2), pp. 365–394. doi: 10.1007/s00148-015-0578-4.

Ferrer-i-Carbonell, A. and Frijters, P. (2004) 'How important is methodology for the estimates of the determinants of happiness?', *The Economic Journal*, 114(497), pp. 641–659. doi: 10.1111/j.1468-0297.2004.00235.x.

Fleurbaey, M. (2009) 'Beyond GDP: The quest for a measure of social welfare', *Journal of Economic Literature*, 47(4), pp. 1029–1075. doi: 10.1257/jel.47.4.1029.

Frank, K., Hou, F. and Schellenberg, G. (2016) 'Life satisfaction among recent immigrants in Canada: Comparisons to source-country and host-country populations', *Journal of Happiness Studies*. Springer Netherlands, 17(4), pp. 1659–1680. doi: 10.1007/s10902-015-9664-2.

Frey, B. S. and Stutzer, A. (2002) 'What can economists learn from happiness research?', *Journal of Economic Literature*, 40(2), pp. 402–435.

Frijters, P., Haisken-DeNew, J. P. and Shields, M. A. (2004) 'Investigating the patterns and determinants of life satisfaction in Germany following reunification', *Journal of Human Resources*. University of Wisconsin Press, XXXIX(3), pp. 649–674. doi: 10.3368/jhr.XXXIX.3.649.

Gelatt, J. (2013) 'Looking down or looking up: Status and subjective well-being among Asian and Latino immigrants in the United States', *International Migration Review*, 47(1), pp. 39–75. doi: 10.1111/imre.12013.

Gibson, J. *et al.* (2015) *The long-term impacts of international migration: Evidence from a lottery*. IZA Discussion Paper No. 9492. Available at: http://ftp.iza.org/dp9492.pdf.

Gilbert, D. (2006) *Stumbling on happiness*. Harper Perennial.

Giuntella, O. and Mazzonna, F. (2015) 'Do immigrants improve the health of natives?', *Journal of Health Economics*, 43, pp. 140–153. doi: 10.1016/j.jhealeco.2015.06.006.

Glaesmer, H. *et al.* (2011) 'Health care utilization among first and second generation immigrants and native-born Germans: a population-based study in Germany', *International Journal of Public Health*. SP Birkhäuser Verlag Basel, 56(5), pp. 541–548. doi:

10.1007/s00038-010-0205-9.

Graham, C., Eggers, A. and Sukhtankar, S. (2004) 'Does happiness pay?', *Journal of Economic Behavior & Organization*, 55(3), pp. 319–342. doi: 10.1016/j.jebo.2003.09.002.

Haisken-DeNew, J. and Sinning, M. (2010) 'Social deprivation of immigrants in Germany', *Review of Income and Wealth*. Blackwell Publishing Ltd, 56(4), pp. 715–733. doi: 10.1111/j.1475-4991.2010.00417.x.

Harris, J. R. and Todaro, M. P. (1970) 'Migration, unemployment and development: A two-sector analysis', *American Economic Review*. American Economic Association, pp. 126–142. doi: 10.2307/1807860.

Hendriks, M. and Bartram, D. (2016) 'Macro-conditions and immigrants' happiness: Is moving to a wealthy country all that matters?', *Social Science Research*, 56, pp. 90–107. doi: 10.1016/j.ssresearch.2015.11.006.

Hicks, S., Tinkler, L. and Allin, P. (2013) 'Measuring subjective well-being and its potential role in policy: Perspectives from the UK Office for National Statistics', *Social Indicators Research*. Dordrecht: Springer Science & Business Media, 114(1), pp. 73–86. doi: http://dx.doi.org/10.1007/s11205-013-0384-x.

Ivlevs, A. (2015) 'Happy moves? Assessing the link between life satisfaction and emigration intentions', *Kyklos*, 68(3), pp. 335–356. doi: 10.1111/kykl.12086.

De Jong, G. F. *et al.* (1983) 'International and internal migration decision making: A value-expectancy based analytical framework of intentions to move from a rural Philippine province', *International Migration Review*. Center for Migration Studies of New York, Inc., 17(3), p. 470. doi: 10.2307/2545798.

De Jong, G. F., Chamratrithirong, A. and Tran, Q.-G. (2002) 'For better, for worse: Life satisfaction consequences of migration', *International Migration Review*. Blackwell Publishing Ltd, 36(3), pp. 838–863. doi: 10.1111/j.1747-7379.2002.tb00106.x.

Kahneman, D., Wakker, P. P. and Sarin, R. (1997) 'Back to Bentham? Explorations of experienced utility', *Quarterly Journal of Economics*. Oxford University Press, 112(2), pp. 375–405. doi: 10.2307/2951240.

Kirmanoğlu, H. and Başlevent, C. (2014) 'Life satisfaction of ethnic minority members: An examination of interactions with immigration, discrimination, and citizenship', *Social Indicators Research*. Springer Netherlands, 116(1), pp. 173–184. doi: 10.1007/s11205-013-

0276-0.

Koczan, Z. (2013) *Does integration increase life satisfaction?* CWPE 1314. doi: https://doi.org/10.17863/CAM.5392.

Kóczán, Z. (2016) '(Why) are immigrants unhappy?', *IZA Journal of Migration*. Springer Berlin Heidelberg, 5(1), p. 3. doi: 10.1186/s40176-016-0052-4.

Kuroki, M. (2018) 'Racial diversity, immigrants and the well-being of residents: Evidence from US counties', *Journal of Population Economics*. Springer Berlin Heidelberg, 31(1), pp. 107–133. doi: 10.1007/s00148-017-0657-9.

Layard, R. (2005) *Happiness: Lessons from a new science*. Penguin.

Layard, R. (2010) 'Measuring subjective well-being', *Science*. American Association for the Advancement of Science, 327(5965), pp. 534–535. Available at: http://www.jstor.org/stable/40510173.

Leopold, L., Leopold, T. and Lechner, C. M. (2017) 'Do immigrants suffer more from job loss? Unemployment and subjective well-being in Germany', *Demography*, 54(1), pp. 231–257.

Levinson, A. (2012) 'Valuing public goods using happiness data: The case of air quality', *Journal of Public Economics*, 96(9), pp. 869–880. doi: 10.1016/j.jpubeco.2012.06.007.

Ljunge, M. (2016) 'Migrants, health, and happiness: Evidence that health assessments travel with migrants and predict well-being', *Economics & Human Biology*, 22, pp. 35–46. doi: 10.1016/j.ehb.2016.03.004.

Loewenstein, G. and Ubel, P. A. (2008) 'Hedonic adaptation and the role of decision and experience utility in public policy', *Journal of Public Economics*, 92(8–9), pp. 1795–1810. doi: 10.1016/j.jpubeco.2007.12.011.

Lucas, R. E. *et al.* (2004) 'Unemployment alters the set point for life satisfaction.', *Psychological science*, 15(1), pp. 8–13. Available at: http://www.ncbi.nlm.nih.gov/pubmed/14717825 (Accessed: 21 January 2014).

Michalos, A. C. and Zumbo, B. D. (2001) 'Ethnicity, modern prejudice and the quality of life', *Social Indicators Research*. Kluwer Academic Publishers, 53(2), pp. 189–222. doi: 10.1023/A:1026596132069.

Mukherjee, B. *et al.* (2008) 'Fitting stratified proportional odds models by amalgamating

conditional likelihoods', *Statistics in Medicine*. John Wiley & Sons, Ltd., 27(24), pp. 4950–4971. doi: 10.1002/sim.3325.

Nesterko, Y. *et al.* (2013) 'Life satisfaction and health-related quality of life in immigrants and native-born Germans: the role of immigration-related factors', *Quality of Life Research*. Springer Netherlands, 22(5), pp. 1005–1013. doi: 10.1007/s11136-012-0239-y.

Nikolova, M. and Graham, C. (2015) 'In transit: The well-being of migrants from transition and post-transition countries', *Journal of Economic Behavior & Organization*, 112, pp. 164–186. doi: 10.1016/j.jebo.2015.02.003.

Nowok, B. *et al.* (2013) 'Does migration make you happy? A longitudinal study of internal migration and subjective well-being', *Environment and Planning A*. SAGE Publications, 45(4), pp. 986–1002. doi: 10.1068/a45287.

O'Brien, E., Ellsworth, P. C. and Schwarz, N. (2012) *Today's misery and yesterday's happiness: Differential effects of current life-events on perceptions of past wellbeing*, *Journal of Experimental Social Psychology*. doi: 10.1016/j.jesp.2012.02.018.

O'Donnell, G. and Oswald, A. J. (2015) 'National well-being policy and a weighted approach to human feelings', *Ecological Economics*, 120, pp. 59–70. doi: 10.1016/j.ecolecon.2015.09.021.

Obućina, O. (2013) 'The patterns of satisfaction among immigrants in Germany', *Social Indicators Research*. Springer Netherlands, 113(3), pp. 1105–1127. doi: 10.1007/s11205-012-0130-9.

OECD (2013) 'OECD guidelines on measuring subjective well-being'. OECD Publishing. Available at: /content/book/9789264191655-en.

Olgiati, A., Calvo, R. and Berkman, L. (2013) 'Are migrants going up a blind alley? Economic migration and life satisfaction around the world: Cross-national evidence from Europe, North America and Australia', *Social Indicators Research*. Springer Netherlands, 114(2), pp. 383–404. doi: 10.1007/s11205-012-0151-4.

Oswald, A. J., Proto, E. and Sgroi, D. (2015) 'Happiness and productivity', *Journal of Labor Economics*. University of Chicago PressChicago, IL, 33(4), pp. 789–822. doi: 10.1086/681096.

Pakrashi, D. and Frijters, P. (2013) *Happiness assimilation amongst migrants: Evidence from Australia*, *Job Market paper*. Available at:

https://www.melbourneinstitute.com/downloads/hilda/Bibliography/Other_Publications/2013/Pakrashi_etal_Job Market Paper.pdf.

van Praag, B. M. S. and Baarsma, B. E. (2005) 'Using happiness surveys to value intangibles: The case of airport noise', *The Economic Journal*. Blackwell Publishing Ltd, 115(500), pp. 224–246. doi: 10.1111/j.1468-0297.2004.00967.x.

Pudney, S. (2011) 'Perception and retrospection: The dynamic consistency of responses to survey questions on wellbeing', *Journal of Public Economics*. North-Holland, 95(3–4), pp. 300–310. doi: 10.1016/J.JPUBECO.2010.08.004.

Rogers-Sirin, L., Ryce, P. and Sirin, S. (2014) 'Acculturation, acculturative stress, and cultural mismatch and their influences on immigrant children and adolescents' well-being', in *In Global Perspectives on Well-Being in Immigrant Families*. New York: Springer, pp. 11–30.

Safi, M. (2010) 'Immigrants' life satisfaction in Europe: Between assimilation and discrimination', *European Sociological Review*. Oxford University Press, 26(2), pp. 159–176. doi: 10.1093/esr/jcp013.

Schwartz, C. E. *et al.* (2013) 'Guidelines for secondary analysis in search of response shift', *Quality of Life Research*, 22(10), pp. 2663–2673. doi: 10.1007/s11136-013-0402-0.

Senik, C. (2014) 'The French unhappiness puzzle: The cultural dimension of happiness', *Journal of Economic Behavior & Organization*, 106, pp. 379–401. doi: 10.1016/j.jebo.2014.05.010.

Shemyakina, O. N. and Plagnol, A. C. (2012) 'Subjective well-being and armed conflict: Evidence from Bosnia-Herzegovina', *Social Indicators Research*, 113(3), pp. 1129–1152. doi: 10.1007/s11205-012-0131-8.

Simpson, N. (2013) 'Happiness and migration', in Constant, A. F. and Zimmermann, K. F. (eds) *International Handbook on the Economics of Migration*. Edward Elgar Publishing, pp. 393–407.

Sjaastad, L. A. (1962) 'The costs and returns of human migration', *Journal of Political Economy*. The University of Chicago Press, 70(5), pp. 80–93. doi: 10.2307/1829105.

Stiglitz, J. E., Sen, A. and Fitoussi, J. P. (2009) *Report of the Commission on the Measurement of Economic Performance and Social Progress (CMEPSP).*

Stillman, S. *et al.* (2015) 'Miserable migrants? Natural experiment evidence on international migration and objective and subjective well-being', *World Development*, 65, pp. 79–93. doi: 10.1016/j.worlddev.2013.07.003.

Switek, M. (2016) 'Internal migration and life satisfaction: well-being paths of young adult migrants', *Social Indicators Research*. Springer Netherlands, 125(1), pp. 191–241. doi: 10.1007/s11205-014-0829-x.

Taengnoi, S. (2014) 'Economic man and social woman: Determinants of immigrants' life satisfaction', *Economics Bulletin*. AccessEcon, 34(3), pp. 1530–1549. Available at: https://ideas.repec.org/a/ebl/ecbull/eb-13-00658.html (Accessed: 25 May 2017).

Di Tella, R. and MacCulloch, R. (2006) 'Some uses of happiness data in economics', *Journal of Economic Perspectives*. American Economic Association, 20(1), pp. 25–46. doi: 10.2307/30033632.

Di Tella, R., MacCulloch, R. J. and Oswald, A. J. (2003) 'The macroeconomics of happiness', *Review of Economics and Statistics*. MIT Press 238 Main St., Suite 500, Cambridge, MA 02142-1046 USA journals-info@mit.edu, 85(4), pp. 809–827. doi: 10.1162/003465303772815745.

Verkuyten, M. (2008) 'Life satisfaction among ethnic minorities: The role of discrimination and group identification', *Social Indicators Research*. Springer Netherlands, 89(3), pp. 391–404. doi: 10.1007/s11205-008-9239-2.

Voicu, B. and Vasile, M. (2014) 'Do "cultures of life satisfaction" travel?', *Current Sociology*. SAGE PublicationsSage UK: London, England, 62(1), pp. 81–99. doi: 10.1177/0011392113516651.

de Vroome, T. and Hooghe, M. (2014) 'Life satisfaction among ethnic minorities in the Netherlands: Immigration experience or adverse living conditions?', *Journal of Happiness Studies*. Springer Netherlands, 15(6), pp. 1389–1406. doi: 10.1007/s10902-013-9483-2.

Wagner, G. G. *et al.* (2008) 'Das Sozio-oekonomische Panel (SOEP): Multidisziplinäres Haushaltspanel und Kohortenstudie für Deutschland – Eine Einführung (für neue Datennutzer) mit einem Ausblick (für erfahrene Anwender)', *AStA Wirtschafts-und Sozialstatistisches Archiv*, 2(4), pp. 301–328.

Wagner, G. G., Frick, J. R. and Schupp, J. (2007) 'The German Socio-Economic Panel Study (SOEP) – Scope, evolution and enhancements', *Schmollers Jahrbuch*, 127(1), pp. 139–169.

Wengler, A. (2011) 'The health status of first- and second-generation Turkish immigrants in Germany', *International Journal of Public Health*. SP Birkhäuser Verlag Basel, 56(5), pp. 493–501. doi: 10.1007/s00038-011-0254-8.

Wilson, T. D. and Gilbert, D. T. (2003) 'Affective forecasting', in Zanna, M. P. (ed.) *Advances in experimental social psychology, Vol. 35*. San Diego, CA: Academic Press, pp. 345–411.

Wooldridge, J. M. (2002) *Econometric analysis of cross section and panel data*. Cambridge, MA: MIT Press.

Yahirun, J. J. (2014) 'Take me "home": Return migration among Germany's older immigrants', *International Migration*, 52(4), pp. 231–254. doi: 10.1111/imig.12009.

Appendix A - The health variables in the SOEP

Starting in 2002 and continuing every other year after that, the SOEP contains a battery of questions which differ only slightly from the SF-12 health questionnaire. The questionnaire contains 12 questions and is easily found online. The 12 questions are grouped into the following eight categories: physical functioning, bodily pain, general health, vitality, mental health, social functioning, role functioning (physical) and role functioning (emotional).

Each of these categories are normalised to a mean of 50 and standard deviation of 10. The two variables "physical health" (PH) and "mental health" (MH) were then constructed by explorative factor analysis. The detailed description of these variables can be found in Andersen et al. (2007). The health variables we use in our analysis are number of hospital visits in the last year, PH, MH, a dummy for whether the respondent is hindered by his health, a dummy for whether the respondent suffers from a chronic illness and a dummy for whether the respondent did not see a doctor in the last year.

Appendix B - The fixed effects ordered logit model

We sketch here the fixed effects ordered logit model as proposed in Mukherjee et al. (2008) and Baetschmann et al. (2015). The latent variable y_{it}^* is modelled as

$$y_{it}^* = X_{it}\beta + a_i + \varepsilon_{it} \tag{7}$$

and the respondent's answer to an ordered choice of options is characterised by

$$y_{it}^t = k \text{ iff } \tau_i^{k-1} < X_{it}\beta + a_i + \varepsilon_{it} < \tau_i^k \tag{8}$$

The idea of the estimator is the following: for a given cut-off value k, dichotomise the ordinal variable, e.g. $\tilde{y}_{it} = \mathbb{I}(y_{it} > k)$. Chamberlain's conditional logit model is derived from the likelihood of the sequence of $\tilde{y}_{it} = (\tilde{y}_{i1}, \dots \tilde{y}_{iT})$ conditional on the number of ones in the sequence of answers being equal to $\sum_{t=1}^{T_i} \tilde{y}_{it}$. Denoting this by P_i^k, the estimator combines all the possible dichotomisations (with K categories, there are K-1 possible dichotomizations) in one log likelihood and maximises it over b

$$\max_b LL = \sum_{i=1}^N \sum_{k=1}^{K-1} \ln P_i^k(X, b) \tag{9}$$

If ε_{it} is a logistically distributed random variable with location 0 and scale 1, an individual's likelihood $P_i^k(X, b)$ is given by

$$P_i^k(X, b) = \frac{\prod_{t=1}^{T_i} \exp(\tilde{y}_{it} * X_{it}\beta)}{\sum_{d_i \in D_i} \prod_{t=1}^{T_i} \exp(d_{it} * X_{it}\beta)}$$

where $d_{it} \in \{0,1\}$, $d_i = (d_{i1} \dots d_{iT_i})$ and D_i is the set of all distinct d_i such that $\sum_t d_{it} = \sum_t \tilde{y}_{it}$.

Appendix C – Identification strategy for our model

The threshold is applied to both equations (1) and (2) by respondents who evaluate their current as well as past LS. The answers to the two questions can then be characterised by

$$y_{it} = k \text{ iff } \tau_i^k - a_i < \beta_0' x_{it} + (\beta_1 - \alpha_1)YSM_{it} + (\beta_2 - \alpha_2)HS_{it} + \varepsilon_{it} < \tau_i^{k+1} - a_i \tag{4}$$

$$y_{it}^{t-1} = k' \text{iff } \tau_i^{k'} < \delta_0\big(\beta_0' x_{i,t-1} + \beta_1 YSM_{i,t-1} + \beta_2 HS_{i,t-1} + a_i\big)$$

$$+\delta_1\big(\beta_0' x_{it} + \beta_1 YSM_{it} + \beta_2 HS_{i,t} + a_i + \varepsilon_{it}\big) - \alpha_1 YSM_{it} - \alpha_2 HS_{it} + \tilde{u}_{it} < \tau_i^{k'+1} \tag{5}$$

The composite error $\delta_1 \varepsilon_{it} + \tilde{u}_{it}$ will not be logistically distributed even if ε_{it} and $\tilde{u}_{it}$ are, but it will approximately be logistically distributed if ε_{it} and $\tilde{u}_{it}$ are logistically distributed. Let the scale parameter of the composite error be σ. Denoting $\tilde{a}_i \equiv \frac{(\delta_0 + \delta_1)a_i - \delta_0\beta_1}{\sigma}$, and

substituting $YSM_{i,t-1} = YSM_{it} - 1$ for immigrants[11] we can rewrite equation (5) as

$$y_{it}^{t-1} = k' \text{ iff } \frac{\tau_i^{k'}}{\sigma} - \tilde{a}_i < \frac{\delta_0}{\sigma}\beta_0' x_{i,t-1} + \frac{\delta_1}{\sigma}\beta_0' x_{it} + \frac{\beta_1(\delta_0+\delta_1)-\alpha_1}{\sigma}YSM_{it} +$$

$$+ \frac{\delta_0}{\sigma}\beta_2\, HS_{i,t-1} + \frac{(\delta_1\beta_2 - \alpha_2)}{\sigma}HS_{it} + u_{it} < \frac{\tau_i^{k'+1}}{\sigma} - \tilde{a}_i \qquad (6)$$

where u_{it} now is logistically distributed with scale parameter 1. We start with the blow-up and cluster estimation of equation (4) obtaining the parameters β_0 , $\beta_1 - \alpha_1$, and $\beta_2 - \alpha_2$. With β_0 we can construct the variable $z_{it} = \beta_0' x_{it}$ and use z_{it} and $z_{i,t-1}$ in equation (6), which again we estimate with the blow-up and cluster estimator. This yields the two parameters $\frac{\delta_0}{\sigma}$ and $\frac{\delta_1}{\sigma}$, which can be interpreted as the influence of past LS and current LS on the respondent's memory of her past LS. Knowing $\frac{\delta_0}{\sigma}$ allows identification of β_2 which in turn allows identification of α_2 and then of σ. The last parameter from this stage is $\frac{\beta_1(\delta_0+\delta_1)-\alpha_1}{\sigma}$. Together with $\beta_1 - \alpha_1$ from the first stage β_1 and α_1 are also identified.

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[11] For natives YSM is always zero.