

# Income Comparisons Among Neighbours and Satisfaction in East and West Germany

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**Abstract** A series of studies have suggested that changes in others' income may be perceived differently in post-transition and capitalist societies. This paper draws on the German Socio-economic Panel Study (SOEP) matched with micro-marketing indicators of population characteristics in very tightly drawn neighbourhoods to investigate whether reactions to changes in their neighbours' income divide the German nation. We find that the neighbourhood income effect for West Germany is negative (which is in line with the 'relative income' hypothesis) and slightly more marked in neighbourhoods that may be assumed to be places where social interactions between neighbours take place. In contrast, the coefficients on neighbourhood income in East Germany are positive (which is consistent with the 'signalling' hypothesis), but statistically not significant. This suggests not only that there is a divide between East and West Germany, but also that neighbours may not be a relevant comparison group in societies that have comparatively low levels of neighbouring.

**Keywords** Comparison income · Reference group · Life satisfaction · Neighbourhood effects · Panel data analysis

## 1 Introduction

A number of studies in the field of happiness research have shown that people evaluate their life more positively the more income they have, but that they also take into account how this income compares to that of others (e.g. Blanchflower and Oswald 2004; Clark and Oswald 1996; Easterlin 1974; Ferrer-i-Carbonell 2005; Frey and Stutzer 2002). Typically the research has been undertaken for industrialised countries and set out to test empirically the "relative income" hypothesis, which, in brief, states that the utility people derive from consumption and savings depends more on one's income in relation to others than on an abstract standard of living (Duesenberry 1949). The implied negative relationship between

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others' income and life satisfaction<sup>1</sup> could be shown for comparisons with others in the same society and also for others in the same profession (Clark and Oswald 1996; Diener et al. 1993; Easterlin 1995; Ferrer-i-Carbonell 2005).

There have been two rather new developments in this field of research. Firstly, authors like Senik (2004, 2008) and Caporale et al. (2009) have investigated the hypothesis in former socialist countries, yielding that the relationship between changes in others' income and life satisfaction is positive. They argue that this is in line with Hirshman and Rothschild (1973)'s conjecture that in economies, which are characterised by high income inequality, volatility and uncertainty, changes in others' circumstances are taken as a signal about future prospects. In other words, people will speculate that if others can improve their lot so can they, and the expectation of higher incomes in the future will make people happy. Conversely, if others around them are losing out, people will be unhappier with their life because they cannot be so sure not to experience the same drop in living standards.

Secondly, in response to improved access to geo-coded data that can be linked with large scale social surveys, studies have explored whether people in capitalist societies also take into account how their income compares to that of their neighbours. The results are inconclusive. Luttmer (2005) finds a negative effect of changes in others' income on life satisfaction in the USA. However, the relative income in that study refers to the income of others in the same profession living in the same geographic area and may therefore merely confirm the previous results that people mind if others in the same profession start earning more (which is valuable, albeit a different subject). Knies et al. (2008) find no effect of changes in neighbourhood income on life satisfaction in Germany, and neither do Shields et al. (2009) using data for Australia.

This paper synthesises the two recent foci of the happiness research by investigating the effect on life satisfaction of one's neighbours in East and West Germany. Germany is an exciting case study. Two decades after German re-unification economic circumstances in the two parts of the country are still very different. In the former socialist part of Germany (i.e. the East) unemployment has skyrocketed since the early 1990s and despite some economic growth, unemployment rates continue to be about twice as high than in the West, namely, around 18.5–20.5% compared to 10% in 2006, respectively (Wingter 2008). Chances for households to move up (or the risk to move down) in the income distribution are higher in East Germany than in West Germany (Sachverständigenrat 2009). This is a typical phenomenon in transitional economies and is hypothesised to underlie the positive association between life satisfaction and others' income (Brainard 1998; Senik 2008).

Differences between East and West Germany also extend to average levels of life satisfaction and neighbouring. Easterners have been shown to be systematically unhappier with their lives and only a very small fraction of this variation could be explained by their less favourable economic position (Frijters et al. 2004). Moreover, levels of social interactions between neighbours appear to be less vibrant in the post-transition country (Knies 2009). Easterners may have relied more on their neighbours for small favours like borrowing a cup of sugar to get by. But they may not have trusted neighbours to the same extent as Westerners: getting together socially was regarded with great suspicion, and often got sanctioned, by the GDR regime. It may be that, in a society where trusting

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<sup>1</sup> There is broad consensus in the research community that life satisfaction is a satisfactory proxy for personal utility.

neighbourhood relationships could not flourish for decades, sensitive information on income<sup>2</sup> is not shared with neighbours. Hence, it is unclear whether there will be any association between changes in neighbourhood income and life satisfaction.

### 1.1 Neighbourhood Income and Life Satisfaction

There is a plethora of research that finds that people are happier with their life if they live in less polluted areas (Rehdanz and Maddison 2008), or in areas with access to green space and recreational facilities (Knies et al. 2008), or in areas where there is less crime (McCrea et al. 2005) and more neighbourliness (Shields and Wooden 2003). There also is a huge body of literature looking at how these and other aspects of local neighbourhoods get capitalised in house prices (see, e.g. Gibbons and Machin 2008). By contrast, the conjecture that income levels in the local neighbourhood may affect how satisfied people are with their life is, at least in the empirical literature, a rather recent one and as such not yet well researched.

Better neighbourhoods tend to attract richer neighbours, and we would therefore expect that people will be happier the more affluent their neighbours are (as has been shown by Dittmann and Goebel 2010 using the neighbours' social status rather than income as the key indicator). It is less clear, however, how people will react if their neighbours are getting richer. Will they covet their neighbours' income and dread entering into a struggle to keep up, or will they assume that if the Joneses' purses are filling up now, so will theirs next time round? The research into income comparisons with others in the same profession suggests that which is the case may be determined by the economic system in which the comparisons take place. In societies that are characterised by relatively low levels of actual and perceived mobility, utility tends to be negative in others' income. In post-transitional societies, on the other hand, utility appears to be positive in others' income because, in economic environments characterised by high income inequality, volatility and uncertainty, others' improvement is seen as a signal about future prospects (Brainard 1998; Senik 2008).

Both theoretical links between life satisfaction and others' income rely on the assumption that people know (or learn about) the typical incomes earned by the relevant others under focus. This may very well be the case, for instance, because those working together pick up some information about each other's promotions through direct observation or hearsay, or the unemployed learn about pay levels during their job search. But is it also plausible that people know about the typical income in their neighbourhood? Neighbours will have some idea of how well off the others are, be it for the kind of cars parking in the streets or the size, design and state of repair of local houses. However, neighbourhood populations are more heterogeneous in qualifications than are people in one's profession. Pay levels for many types of jobs the neighbours do may be unknown, and people may not know what their neighbours do for a living. Moreover, people may not even know their neighbours. Unless the neighbours turn their extra pennies into visible consumer goods, it is extremely unlikely that people will know about changes in neighbourhood income, hence, to be hurt or happy about others' changing position. In places,

<sup>2</sup> Talking about one's income is one of the big taboo issues in German society. The Gehaltsreport 2009, for example, suggests that people who earn more than average are unwilling to share information on their earnings fearing their colleagues' envy. Conversely, those who earn less than the assumed average are too embarrassed about their income. The Gehaltsreport is a survey undertaken on behalf of Manager Magazine Germany and looks into how well-paid professionals in Germany are. <http://www.spiegel.de/unispiegel/jobundberuf/0,1518,652626,00.html> (German only).

where close bonds between people exist, on the other hand, the information may be more readily available.

## 2 Empirical Strategy

To investigate differences in East and West Germany in the correlation between life satisfaction and neighbourhood income, the analysis proceeds in three stages. The first stage describes the neighbourhood context in East and West Germany. A particular focus is on whether there are differences in the intensity of neighbourly relationships and on describing inequalities in neighbourhood incomes and changes thereof. The second and third stages are concerned with empirically identifying the comparison effect and subjecting it to alternative interpretations, respectively.

### 2.1 Empirical Identification: The Econometric Model

Following the familiar approach in the literature I estimate a standard micro-economic life satisfaction function (Clark et al. 2008; Clark and Oswald 1996; Frey and Stutzer 2002), but allowing for variation in the neighbourhood  $j$  in which an individual  $i$  lives at time  $t$

$$S_{it} = \alpha + \beta'X_{it} + \gamma'N_{jt} + \zeta_{it} \quad (1)$$

where  $S$  is a continuous measure of life satisfaction,<sup>3</sup>  $X$  is a vector of observed characteristics that are held to influence life satisfaction,  $N$  is a vector of observed characteristics of neighbourhood  $j$  which are held to influence life satisfaction (including neighbourhood income), and  $\zeta_{it}$  is an error term.

We are interested in obtaining an unbiased estimate of a particular  $\gamma$ , i.e. the extent to which life satisfaction changes as neighbourhood income changes. There are, however, a number of potential problems for identification of this effect. There may be large biases on  $\gamma$  from omitted variables associated with neighbourhood selection. People who mind having richer neighbours may decide not to live in a neighbourhood that attracts rich people, or may respond to observed changes in their neighbours' income by subsequently exiting the neighbourhood. Moreover, unobserved characteristics of the neighbourhood that are correlated with neighbourhood income and life satisfaction may bias our estimate of  $\gamma$ .

I use a fixed effects modelling approach to minimise such potential biases in as much as is feasible. In the fixed effects model we look at how changes in life satisfaction are correlated with changes in observed characteristics. In this model Eq. 1 turns into

$$\Delta S_i = \Delta\alpha + \beta'(\Delta X_i) + \theta'(\Delta Z_i) + \Delta\zeta_i \quad (2)$$

The effect of unobserved individual characteristics that do not change over time (the so-called 'fixed effect') cannot be identified but is implicitly estimated. I will assume that the unobserved underlying preference of individual  $i$  to live in a particular neighbourhood  $j$  is fixed in our observation period (i.e. 1 year).

Note that the effects yielded from estimating Eq. 2 may also be confounded by variation in neighbourhood characteristics which are not observed. Such effects may derive, for instance, from living close to natural attractions like forests, lakes or mountains, from a

<sup>3</sup> This is measured on a cardinal scale. Ferrer-i-Carbonell and Frijters (2004) show that the difference is negligible.

better micro-climate (Rehdanz and Maddison 2008), or from a more pleasant built environment. I implicitly estimate the effect of unobserved neighbourhood characteristics by restricting the sample to non-movers.

Like other methods, this modelling approach cannot take care of unobserved characteristics that vary over time, and, unfortunately, it takes away a large number of degrees of freedom, making it difficult to statistically identify any effects.

## 2.2 Robustness Tests

To investigate the conjecture that neighbourhoods may need to be places where people know each other well enough to share information about their income for the comparison effect to operate, I split the sample into two groups where I assume that one group has a greater chance of knowing their neighbours' income. The first split is by whether or not people live on small residential streets. These streets have been shown to be places where lively, close-knit communities tend to exist (Grannis 2004). The second split is by whether or not people report that their neighbourhood is a place where close ties between neighbours exist. The third split is by whether or not people report that they live in a neighbourhood where the neighbours at least know each other. If the intensity of neighbourhood ties matters, we would expect that the effects are somewhat more marked for people living in more connected neighbourhoods than for their counterparts living in less connected neighbourhoods.

The analysis proceeds to testing specific hypotheses about the effects in both parts of the country. For West Germany, following Knies et al. (2008), we expect a negative effect of neighbourhood income on life satisfaction and hypothesise that the effect will be more marked for individuals who may be assumed to have closer bonds and a better knowledge of their neighbourhood. We will proxy this by whether or not children aged 0–6 live in the household (these people may use local institutions and may be more likely to talk to or about neighbours), whether or not a person works in the town in which she lives (these persons may know local incomes better) or does not work (these persons may spend more time in the neighbourhood), and whether or not the members of the household socialise with their neighbours (which may increase the number of channels via which people hear about changes in neighbours' income). Note that, to avoid pain, people may prefer to not socialise with neighbours if they envy the others' income (i.e. socialising may be endogenous).

For East Germany, following Senik (2004), we expect a positive association between neighbourhood income and life satisfaction and hypothesise that this effect will be more marked for people who may be assumed more likely to review their own income expectation in light of observing changes in their neighbours' income. Two groups for which this may be the case are people who in the year prior to our observation period were worried or very worried about their financial situation. People who are worried may be more inclined than others to seek assurance from others in order to get out of that undesirable state of worry. Learning that there is an economic upward (downward) trend around them may lead them to raise (lower) their own expectations.<sup>4</sup> Two further groups who may be assumed to change their income expectations more are males and people who are younger than 40. While males typically have a greater labour market attachment, young people, in all

<sup>4</sup> In support of this conjecture, our data show that people who live in neighbourhoods that have improved from  $t$  to  $t + 1$  are not as often very worried about their economic situation as their counterparts in neighbourhoods where incomes stagnated or dropped.

likelihood, will have a greater chance of hopping onto the bandwagon (e.g. through finding a better paying job). Moreover, the value of receiving signals about future prospects may be expected to be relatively higher for young people who have more time yet to take advantage of emerging job opportunities.

### 3 Data

This paper uses the 2004 and 2005 waves of the German Socio-economic Panel Study (SOEP) matched with micro-marketing indicators of population characteristics in very tightly drawn neighbourhoods. SOEP is an internationally renowned longitudinal survey representative of the German population living in private households. The survey started in 1986 and contains data on a wide range of economic and social topics.<sup>5</sup> It has frequently been used in the research on comparison income (see, e.g. Ferrer-i-Carbonell and Frijters 2004; Frijters et al. 2004).

The outcome variable, life satisfaction, is measured annually by the following question: “How satisfied are you at present with your life, all things considered?” There are eleven response categories running from 0 (completely dissatisfied) to 10 (completely satisfied). Socio-economic and demographic characteristics which have been shown in the empirical literature to influence life satisfaction (i.e. age, gender and education, in addition to indicators of the family context and financial situation, and health) are also available for every wave of the survey.

A lesser known feature of the survey, which we exploit in this paper, is that SOEP provides information about the local neighbourhood from a number of different sources (see Knies and Spiess 2007 for a comprehensive overview). In 5-yearly intervals, respondents are asked to report on the availability of and distance to local amenities, and on the social relationships in their neighbourhood. This information is available for 2004, and we use it to explore whether there are differences in East and West Germany in the local opportunity structure for knowing about changes in the life circumstances of neighbours.

For recent years of the survey, SOEP also offers a wide range of neighbourhood indicators generated for micro-marketing purposes by a private geo-marketing firm, Microm GmbH. The data has been added to SOEP by the SOEP Group using the survey respondents’ address files and is available for all neighbourhoods in which respondents to SOEP live. The data offers, among life style and socio-demographic indicators, an indicator of whether or not a person lives on a residential street which I use to proxy places where social interactions among neighbours may be more likely and the neighbours may know each other better.

The key explanatory variable, too, is from this source. The neighbourhood income is an area-level *estimate* of the average purchasing power. Purchasing power is defined as the sum of all market incomes, income maintenance transfers and social security payments, other regular monetary transfers, and income of non-profit organisations, assumed asset income flows, refunds from health insurers, sick payments, and income from living in owner-occupied housing, less taxes on income and assets, national insurance contributions and other regular payments. This follows the German Federal Statistical Office’s definition of income (hence the dubbing of the indicator as ‘neighbourhood income’).

<sup>5</sup> For further information see Wagner et al. (2007).

Neighbourhood income is expressed as income 'per household' and the currency is Euro. It is measured at street section level. Microm GmbH divides Germany up into 1.5 million street sections containing an average of 25 households.<sup>6</sup> Street section areas comprise of households that live next door to each other and live on the same side of the street. Measuring neighbourhood income at this geographical scale has a number of advantages. Firstly, because there are so few neighbours, the likelihood of their knowing each other's life circumstances well enough to let this affect individual life satisfaction may be higher. Secondly, the neighbours may be more likely to have contact to each other as they will be able to get to each other and chat to each other without having to cross a (potentially busy) street (Grannis 1998, 2001). A disadvantage of this measure is, however, that it does not consider any comparisons to neighbours that live on the other side of the street.<sup>7</sup>

All incomes are adjusted to 2004 prices and enter the models in log form. This is to reflect diminishing marginal returns to income, a consistent finding across various definitions of life satisfaction in the literature (Frey and Stutzer 2002). To absorb any biases on the comparison effect to do with the spurious correlation between neighbourhood income and neighbourhood quality, the models control for how satisfied respondents to SOEP are with the services provided in their local area. Satisfaction with local services is measured in the same way as life satisfaction (i.e. on an eleven point Likert scale) and is available from the main survey for 2004 and 2005 (hence the selection on these two waves of the survey).

## 4 Results

### 4.1 Neighbourhoods in East and West Germany

Table 1 provides information on neighbourhood contexts in East and West Germany. There are significant differences. While the greatest share of the population in West Germany lives in mid-sized towns or villages in communities that tend to be dominated by single occupancy homes, the Eastern German population tends to live in villages or city neighbourhoods that are dominated by houses shared by more than two parties or apartment blocks. Easterners, on average, are also less satisfied with the quantity and quality of services and amenities provided in their local area.

The majority of the population in both parts of the country lives on residential streets (i.e. streets which are not also home to restaurants, shops or firms). The proportion is four percentage points higher in West Germany, however. If residential streets are places where social bonds between people are more likely to exist, this may indicate that there is less connectedness among people in the East. In support of this conjecture, Westerners are also more likely than their counterparts in the East to report living in neighbourhoods where the intensity of neighbourhood social contacts is higher.

Table 2 reports the associations with life satisfaction of neighbourhood characteristics in both parts of Germany for the year 2004. Neighbourhood characteristics significantly

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<sup>6</sup> Households are statistically defined on the basis of the last names of the people living in the same building. Note that this is a different conceptualisation of household from that in SOEP, where cohabiting people regardless of their family name are considered as one household.

<sup>7</sup> The analysis presented here was also undertaken using the neighbourhood indicator measured at the scale of market-cells. Market-cells comprise of adjacent street-sections and are home to an average of 400 households. The results did not change.

**Table 1** Neighbourhood contexts in East Germany and West Germany 2004

	East Germany	West Germany	Pearson Chi <sup>2</sup>	Pr
Population share living in community of type				
Village, small town, single occupancy	0.29	0.28	23.8	0.000
Village, small town, not single occupancy	0.15	0.09	56.4	0.000
Mid-size town, single occupancy	0.04	0.17	35.2	0.000
Mid-size town, not single occupancy	0.11	0.12	8.3	0.004
City, single occupancy	0.03	0.07	77.7	0.000
City, old build., not single occupancy	0.13	0.07	58.8	0.000
City, new build., not single occupancy	0.12	0.08	61.7	0.000
City, mixed housing stock, other	0.13	0.12	0.2	0.672
Mean satisfaction with local services	6.17	6.55	6.0	0.000
Population share living on residential streets	0.53	0.56	13.2	0.000
Population share living in a neighbourhood where				
Neighbours hardly know each other	0.10	0.08	16.3	0.000
Neighbours sometimes talk to each other	0.61	0.58	18.5	0.000
Neighbours have relatively close relationships	0.22	0.23	18.1	0.000
Neighbourhood social relations vary	0.08	0.10	21.5	0.000

Information is weighted using person weights provided in SOEP

Source SOEP 23 matched with micromarketing indicators

affect life satisfaction in both parts of the country; the null hypothesis that all coefficients relating to neighbourhood features are jointly equal to zero is strongly rejected (East:  $F(13, 3957) = 7.12, p < 0.001$ ; West:  $F(13, 10830) = 16.12, p < 0.001$ ).

However, there are some differences. For Easterners, there is no statistically significant association between life satisfaction and the type of community ( $F(7, 3957) = 1.93, p > 0.06$ ), whilst there is for Westerners ( $F(7, 10830) = 3.73, p < 0.001$ ). The association with life satisfaction of the intensity of neighbourhood social relationships is highly significant in both parts of the country (East:  $F(3, 3957) = 8.16, p < 0.001$ ; West:  $F(3, 10830) = 16.53, p < 0.001$ ). More specifically, people who report living in neighbourhoods where the neighbours sometimes talk to each other or where the neighbours have relatively close relationships are happier than people who report living in neighbourhoods where the neighbours hardly know each other. Living on a residential street is not associated with life satisfaction. Last but not least, while there is a positive association between life satisfaction and satisfaction with local services in both parts of the country, the association with neighbourhood income is statistically significant only in West Germany. Note that the positive association between life satisfaction and neighbourhood income in the cross-sectional model is in line with the hypothesis that at any one point in time people can be expected to appreciate living in a better-off neighbourhood.

Neighbourhood incomes in the two parts of the country, too, are different. In 2004, the average household income in Eastern neighbourhoods ranged from €20 k to €45 k (Mean: €28 k; see “Appendix 1”). While neighbourhood incomes in West Germany are, on average, €11 k higher than in East Germany (Mean: €39 k, see “Appendix 2”), with neighbourhood incomes ranging from €10 k to over €1.2 m Euro, the West is home to both the poorest and the richest neighbourhoods in Germany.



**Table 2** Ordinary-least-squares regression of life satisfaction on neighbourhood characteristics

	(1) East Germany		(2) West Germany	
	Coefficient	S.E.	Coefficient	S.E.
Type of community (village, small town, single occupancy)				
Village/small town, not single occupancy	-0.08	0.08	-0.18**	0.06
Mid-size town, single occupancy	-0.08	0.13	-0.01	0.04
Mid-size town, not single occupancy	-0.20*	0.10	-0.16**	0.05
City, single occupancy	0.11	0.11	0.09	0.06
City, old build., not single occupancy	0.12	0.10	-0.06	0.07
City, new build., not single occupancy	-0.06	0.09	-0.12	0.07
City, mixed housing stock, other	-0.17	0.10	-0.15*	0.06
Lives on residential street	-0.07	0.05	-0.04	0.03
Intensity of neighbourhood social ties (Neighbours hardly know each other)				
Neighbourhood social relations vary	0.26	0.14	0.10	0.08
Neighbours sometimes talk to each other	0.30**	0.10	0.24***	0.06
Neighbours have relatively close relationships	0.53***	0.12	0.40***	0.07
Annual neighbourhood income (log)	0.11	0.27	0.25*	0.10
Satisfaction with local services (log)	0.43***	0.06	0.38***	0.03
Constant	1.40	2.81	0.91	1.10
R-squared	0.25		0.26	
Observations	3,958		10,831	

## East and West Germany 2004

Models also include controls for age (-) and its square, sex (.), number of years in education (log), married (+) compared to separated, single divorced or widowed, household size [East: (.), West: (+)], very good self-reported health (+) compared to good, satisfactory, poor or very poor health, household income (log) (+), non-employment (-), and non-employment of females [East: (.), West: (-)]. (.) No association, (+) positive association, (-) negative association. Significant at \*\*\* 99%; \*\* 95%; \* 90%

Source SOEP 23 matched with micromarketing indicators

Inequality in incomes in immediate neighbourhoods is interesting in its own right and the relatively low base level of economic activity in East Germany described by the Board of Economic Advisors (Sachverständigenrat 2009) represents the kind of environment in which we may expect people to appreciate improvements in others' living circumstances.<sup>8</sup> However, our identification strategy depends on changes in incomes. If there are no changes in neighbourhood income, identification fails.

Table 3 shows that, in real terms, there is not a lot of change in neighbourhood incomes from 2004 to 2005. On average, the population living in East Germany experienced a drop of €219 in their average neighbours' income. In West Germany, this figure amounts to €773. Average real income losses, both at personal level and at neighbourhood level, appear higher for non-movers. This may reflect both that people often move for economic

<sup>8</sup> Hirshman and Rothschild (1973) use a powerful metaphor for a situation in which individuals will appreciate others' advancements. That is, cars being stuck in a traffic jam for hours (i.e. a situation when there is no movement at all) when suddenly a car further ahead in the queue starts moving again.

**Table 3** Neighbourhood and household income changes in East and West Germany, 2004–2005. (In Euro and 2004 prices)

	East Germany				
	Mean	SD	Min	Max	<i>N</i>
Neighbourhood income					
Whole population	−219	2,250	−16,402	11,382	3,882
Non-movers only	−248	2,008	−8,105	10,977	3,610
Household income					
Whole population	−897	7,406	−60,626	88,150	4,211
Non-movers only	−1,031	7,397	−60,626	71,825	3,916
	West Germany				
	Mean	SD	Min	Max	<i>N</i>
Neighbourhood income					
Whole population	−773	3,222	−32,301	85,785	10,671
Non-movers only	−809	2,760	−32,301	85,785	9,823
Household income					
Whole population	148	13,161	−66,364	270,151	10,188
Non-movers only	−22	13,162	−66,364	270,151	9,440

Information is weighted using person weights provided in SOEP

Source SOEP 23 matched with micromarketing indicators

reasons (i.e. because they find a job) and that they tend to move to similar or slightly better neighbourhoods. As expected, the variance of changes in household income is much higher than the variance of changes in mean neighbourhood income (taking the mean of the mean smoothes out more variation). Neighbourhood incomes fluctuate more in West Germany than in East Germany. Conversely, household incomes fluctuate more in East Germany. Note that household incomes and neighbourhood incomes are not directly comparable.<sup>9</sup>

#### 4.2 Neighbourhood Income Effects in East and West Germany

Table 4 reports the results from fixed effects regressions on life satisfaction in East and West Germany. Results are reported for non-movers only.<sup>10</sup>

<sup>9</sup> Neighbourhood income is defined as the sum of all market incomes, income maintenance transfers and social security payments, other regular monetary transfers, and income of non-profit organisations, assumed asset income flows, refunds from health insurers, sick payments, and income from living in owner-occupied housing, less taxes on income and assets, national insurance contributions and other regular payments. The household income measure does not include income of non-profit organisations, sick payments and refunds from health insurers.

<sup>10</sup> I also undertook the analysis for the whole population (see “Appendix 3”). This shows that there is no association between neighbourhood income and life satisfaction in either country. Analysis of non-movers suggests that the psychological response to changes in neighbourhood income is different if induced through moving. The coefficient on neighbourhood income for movers is negative in the East and positive in the West, see “Appendix 4”.

**Table 4** Fixed effects regression of life satisfaction

	(3) East Germany		(4) West Germany	
	Coefficient	S.E.	Coefficient	S.E.
Annual neighbourhood income (log)	0.23	0.38	-0.48*	0.23
Satisfaction with local services (log)	0.15*	0.07	0.18***	0.04
Number of years of education	0.47	1.57	-1.34	1.04
Household size	0.05	0.11	0.12*	0.06
Marital status (married)				
Separated	-0.09	0.40	-0.84***	0.20
Single	0.16	0.39	-0.24	0.19
Divorced	-0.04	0.39	-0.50*	0.20
Widowed	-0.22	0.37	-0.70**	0.26
Subjective health				
Better	0.85***	0.23	0.87***	0.11
Worse	-0.91***	0.18	-0.89***	0.09
Annual household income (log)	-0.19*	0.10	0.01	0.05
Not employed	-0.32**	0.12	-0.57***	0.08
Not employed female	0.29	0.17	0.37***	0.11
Constant	4.23	5.64	14.97***	3.58
R-squared	0.018		0.028	
Observations	3,329		9,085	

East and West Germany 2004–2005. Non-movers only

Significant at \*\*\* 99%; \*\* 95%; \* 90%

Source SOEP 23 matched with micromarketing indicators

The results on socio-economic and socio-demographic characteristics are, broadly speaking, in line with previous findings in the literature. For example, not being employed is negatively associated with life satisfaction but less so for females (see, e.g. Blanchflower and Oswald 2004) who may have alternative role models to their avail (such as being a good mother or wife). Likewise, improvements in self-reported health translate into higher reported life satisfaction while deterioration in one's health translates into lower life satisfaction. Compared to married people, widowers and divorcees are unhappier with their lives<sup>11</sup> (see, e.g. Blanchflower and Oswald 2004; Clark and Oswald 1996). Household income does not affect life satisfaction. However, average changes on these measures are very low in our sample, making it difficult to find statistically significant effects.

With respect to the neighbourhood income effect, the results corroborate the conjecture that the nature of the neighbourhood income effect may be different in East and West Germany. The association between neighbourhood income and life satisfaction is, in all likelihood, positive in East Germany and negative in West Germany.<sup>12</sup> The effect is statistically significant only in the West, however.

<sup>11</sup> At least in West Germany; the effects for East Germany are statistically not significant. There is greater persistence in marital status in East Germany, making it difficult to predict the association with the required level of precision.

<sup>12</sup> The effect in East Germany is not predicted with great precision, hence, it cannot be ruled out that the effect is negative. In all likelihood, however, the coefficient is positive; it is in the majority of the fitted

An objection to the specification may be that people's life satisfaction may not be affected in the same way by positive and negative changes in their neighbours' income. I checked that there is no independent effect of a positive and negative change in neighbourhood income on life satisfaction, varying the definition of what constitutes a change in neighbourhood income. None of the models for either country indicated that the neighbourhood income effect is nonlinear (results not reported).

A further objection to the formulation above may be that people's happiness may only be affected by their neighbours' income changes if their income position relative to that of their neighbours has changed. The data, unfortunately, do not allow me to establish whether people are better off, about the same or worse off than their neighbours at either of the two points in time. I checked, however, whether the neighbourhood income effects are in the same direction for households which had more income in 2005 than in 2004 and for those whose income has dropped. The coefficient on neighbourhood income is positive for both groups in East Germany and it is negative for both groups in West Germany (results not reported).

### 4.3 Robustness Tests

The first robustness tests are concerned with testing the hypothesis that comparison effects are more pronounced, if not operating only, in neighbourhoods where people may know each other well enough to perceive changes in others' income (and be hurt or happy in consequence). Given the baseline models did not yield statistically significant effects for East Germany this may also be regarded a last resort for finding any effect at all.

Table 5 reports separately for East and West Germany the estimation results yielded from restricting the sample to people living on residential streets (Models 5 and 11), living in neighbourhoods where close ties exist between neighbours (Models 6 and 12) or where neighbourhood ties are more intense than just 'hardly knowing each other' (Models 7 and 13). The subsequent three models restrict the sample to the respective flip-side.

As in the baseline models, there are no neighbourhood income effects in East Germany. In West Germany, there are statistically significant negative effects of neighbourhood income on life satisfaction for individuals living on residential streets and for individuals living in neighbourhoods where the neighbours at least know each other. Moreover, the effect appears to be more pronounced in neighbourhoods where we hypothesise that strong(er) bonds exist between people. These differences are not, however, statistically significant. By contrast, the effects of neighbourhood income for people living on residential streets in East Germany ( $\beta$ : 0.67, SE: 0.53) and West Germany ( $\beta$ : -0.76, SE: 0.32) are statistically different;  $t(6,931) = 2.31$ ,  $p < 0.005$ . The same is true for Easterners ( $\beta$ : 0.23, SE: 0.38) and Westerners ( $\beta$ : 0.23, SE: 0.38) who live in neighbourhoods where the neighbours at least know each other;  $t(11,402) = 2.36$ ,  $p < 0.005$ .

Last but not least, Table 6 presents the results from models specified to test common assumptions about the specific effects in the two parts of the country. The models are estimated separately for individuals with characteristics that have been suggested to make

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Footnote 12 continued

models. A formal approximate  $t$  test of the null hypothesis that the neighbourhood income effects in East and West Germany are different yields that they are not;  $t(12413) = 1.60$ ,  $p > 0.01$ .

**Table 5** Fixed effects regressions of life satisfaction differentiated by intensity of neighbourhood social relations

	Neighbourhood income coefficient	S.E.	<i>N</i>	<i>R</i> <sup>2</sup>
East Germany				
(5) Residential streets	0.67	0.53	1,793	0.021
(6) Close ties between neighbours	0.50	0.74	702	0.027
(7) Neighbours at least know each other	0.55	0.38	2,991	0.017
(8) Non-residential streets	-0.31	0.55	1,543	0.025
(9) No close ties between neighbours	-3.55	1.99	278	0.111
(10) Neighbours hardly know each other	0.27	0.44	2,567	0.021
West Germany				
(11) Residential streets	-0.76*	0.32	5,139	0.032
(12) Close ties between neighbours	-0.71	0.47	2,283	0.038
(13) Neighbours at least know each other	-0.50*	0.23	8,412	0.029
(14) Non-residential streets	-0.12	0.33	3,960	0.028
(15) No close ties between neighbours	0.43	0.94	602	0.078
(16) Neighbours hardly know each other	-0.40	0.26	6,731	0.028

East and West Germany 2004–2005. Non-movers only

All models include the same controls as Model 1, see Table 4. Significant at \*\*\* 99%, \*\* 95%, \* 90%

Source SOEP 23 matched with micromarketing indicators

**Table 6** Testing hypotheses about the comparison effect in East and West Germany

	Neighbourhood income coefficient	S.E.	<i>N</i>	<i>R</i> <sup>2</sup>
East Germany				
Worries about financial situation				
(17) Not at all	-0.63	0.76	9,94	0.039
(18) Slightly	0.60	0.51	1,755	0.018
(19) A lot	1.03	0.84	550	0.080
(20) Males	0.30	0.54	1,578	0.023
(21) Aged under 40	1.02	0.81	892	0.015
West Germany				
(22) Young children in household	0.02	0.55	1,834	0.032
(23) Working in town of residence	-0.10	0.47	2,969	0.018
(24) Not working	-0.56	0.36	4,279	0.028
(25) Socialises with neighbours	-0.46	0.28	5,285	0.032

Fixed effects regressions on life satisfaction. East and West Germany 2004–2005. Non-movers only

All models include the same controls as Model 3, see Table 4. Significant at \*\*\* 99%, \*\* 95%, \* 90%

Source SOEP 23 matched with micromarketing indicators

them more likely revise their own income expectations in response to observing income changes in the neighbourhood (East Germany) and more knowledgeable about income levels in the neighbourhood (West Germany), respectively.

The results are consistent with the previous findings. There are no neighbourhood income effects in East Germany. For West Germany, too, none of the neighbourhood income effects are statistically significant. Moreover, there is no difference, in statistical terms, between the neighbourhood income effects for the groups of the population hypothesised to be more prone to respond to changes in their neighbours' income compared to those hypothesised to be less prone.

## 5 Conclusion

I use longitudinal data for East and West Germany matched with micro-marketing data of population characteristics in very immediate neighbourhoods to investigate whether individual life satisfaction is affected by changes in neighbourhood income, and whether the effect differs between East and West Germany. The results confirm the hypothesis that peoples' life satisfaction is affected by their neighbours' income but also highlight that the cultural context matters.

For West Germany, there are statistically significant and negative effects but only in some specifications. In particular, the effects were present only when I controlled for unobserved neighbourhood characteristics by restricting the sample to non-movers. Movers tend to appreciate living in richer neighbourhoods, but non-movers are unhappier if their neighbours are getting richer. The analysis also uncovered a negative income comparison effect by restricting the sample to individuals living on residential streets, suggesting that the existence of social bonds in the neighbourhood may be an important factor in determining whether income comparisons affect life satisfaction. In East Germany, where less intense social bonds exist between neighbours, neighbourhood income has no significance for life satisfaction. The coefficients are systematically positive, which is consistent with the signalling hypothesis, but they are not statistically significant.

It may be that sample sizes in East Germany are too small to estimate the effect with the desired precision and maintaining the same methodological rigour.<sup>13</sup> However, the result could also be indicative of a more general issue. We may not expect people to know about changes in their neighbours' income unless the neighbours talk about it or if visible consumption (for instance, neighbours replacing their cars, undertaking major refurbishment work or doing up the front gardens) is adjusted. Consumption of this type may not be adjusted to the extent that it affects people's perception of how the average neighbourhood income has changed. Neighbourhood social ties, on the other hand, may not be strong enough for sensitive information on income to be shared. If there is neither talking nor visible consumption, we may not find any effect.

Future research may investigate whether this conjecture extends to other neighbourhood effects that are hypothesised to operate via knowing one's neighbours.

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## Appendix 1

See Table 7.

<sup>13</sup> Note that Luttmer (2005)'s comparison effect was not robust to controlling for unobserved neighbourhood heterogeneity.

**Table 7** Summary statistics of sample characteristics

	Mean	SD	Min	Max	<i>N</i>
Life satisfaction	6.26	1.80	0	10	4,289
Neighbourhood income	2,8336	3,047	20,024	44,869	4,289
Satisfaction with local services	6.05	2.62	0	10	4,289
Social visits with neighbours	0.54	0.50	0	1	4,289
Lives on residential street	0.55	0.50	0	1	4,240
Female	0.53	0.50	0	1	4,289
Age	49	17	18	94	4,289
Number of years of education	12.24	2.40	7	18	4,289
Household size	2.55	1.13	1	12	4,289
Lives with children aged 0–6	0.11	0.31	0	1	4,289
Marital status					
Single	0.23	0.42	0	1	4,289
Partner	0.60	0.49	0	1	4,289
Divorced	0.10	0.30	0	1	4,289
Widowed	0.07	0.26	0	1	4,289
Annual per capita household income	12,037	5,911	924	65,611	4,289
Employment status					
Full-time employed	0.39	0.49	0	1	4,289
Part-time employed	0.08	0.27	0	1	4,289
Student, apprentice, military service	0.03	0.17	0	1	4,289
Not employed	0.46	0.50	0	1	4,289
Other employment status	0.04	0.20	0	1	4,289
Works in town where lives	0.29	0.46	0	1	4,289
Self-reported health status					
Very good	0.06	0.24	0	1	4,289
Good	0.40	0.49	0	1	4,289
Fine	0.36	0.48	0	1	4,289
Not good	0.14	0.35	0	1	4,289
Poor	0.04	0.19	0	1	4,289

East Germany 2004

*Source* SOEP 23 matched with neighbourhood indicators

## Appendix 2

See Table 8.

**Table 8** Summary statistics of sample characteristics

	Mean	SD	Min	Max	<i>N</i>
Life satisfaction	6.91	1.78	0	10	11,495
Neighbourhood income	38,625	6,171	10,067	121,758	11,495
Satisfaction with local services	6.48	2.57	0	10	11,495
Social visits with neighbours	0.57	0.50	0	1	11,495

**Table 8** continued

	Mean	SD	Min	Max	N
Lives on residential street	0.58	0.49	0	1	11,441
Female	0.53	0.50	0	1	11,495
Age	49	17	18	95	11,495
Number of years of education	11.79	2.60	7	18	11,495
Household size	2.71	1.28	1	13	11,495
Lives with children aged 0–6	0.18	0.38	0	1	11,495
Marital status					
Single	0.19	0.39	0	1	11,495
Partner	0.67	0.47	0	1	11,495
Divorced	0.08	0.27	0	1	11,495
Widowed	0.07	0.25	0	1	11,495
Annual per capita household income	14,180	7,812	834	72,325	11,495
Employment status					
Full-time employed	0.40	0.49	0	1	11,495
Part-time employed	0.11	0.32	0	1	11,495
Student, apprentice, military service	0.02	0.15	0	1	11,495
Not employed	0.41	0.49	0	1	11,495
Other employment status	0.05	0.22	0	1	11,495
Works in town where lives	0.28	0.45	0	1	11,495
Self-reported health status					
Very good	0.09	0.29	0	1	11,495
Good	0.40	0.49	0	1	11,495
Fine	0.32	0.47	0	1	11,495
Not good	0.14	0.35	0	1	11,495
Poor	0.04	0.19	0	1	11,495

West Germany 2004

Source SOEP 23 matched with neighbourhood indicators

### Appendix 3

See Table 9.

**Table 9** Fixed effects regression of life satisfaction

	East Germany		West Germany	
	Coefficient	S.E.	Coefficient	S.E.
Annual neighbourhood income (log)	0.10	0.36	−0.34	0.20
Satisfaction with local services (log)	0.15*	0.06	0.18***	0.04
Number of years of education	0.44	1.51	−1.74	0.90
Household size	−0.06	0.08	0.08	0.04
Marital status (married)				



**Table 9** continued

	East Germany		West Germany	
	Coefficient	S.E.	Coefficient	S.E.
Separated	-0.43	0.32	-0.54***	0.16
Single	0.26	0.32	-0.16	0.16
Divorced	0.05	0.36	-0.29	0.17
Widowed	-0.42	0.36	-0.65**	0.25
Subjective health				
Better	0.93***	0.22	0.92***	0.11
Worse	-0.81***	0.18	-0.85***	0.09
Annual household income (log)	-0.14	0.09	0.06	0.05
Not employed	-0.37**	0.12	-0.61***	0.08
Not employed female	0.39*	0.16	0.35***	0.11
Constant	5.43	5.37	14.02***	3.10
Observations	3,580		9,804	
R-squared	0.017		0.029	

East and West Germany 2004–2005. Whole population

Significant at \*\*\* 99%; \*\* 95%; \* 90%

Source SOEP 23 matched with micromarketing indicators

## Appendix 4

See Table 10.

**Table 10** Fixed effects regression of life satisfaction

	East Germany		West Germany	
	Coefficient	S.E.	Coefficient	S.E.
Annual neighbourhood income (log)	-0.66	1.21	0.14	0.44
Satisfaction with local services (log)	0.05	0.27	0.15	0.13
Number of years of education	-0.19	5.83	-3.17	2.06
Household size	-0.11	0.18	0.23*	0.10
Marital status (married)				
Separated	-0.99	0.69	-0.07	0.31
Single	0.34	0.73	0.06	0.32
Divorced	1.62	1.18	0.00	0.38
Widowed	-1.78	2.26	0.40	0.94
Subjective health				
Better	1.18	0.75	1.19***	0.35
Worse	0.83	0.93	-0.63*	0.32
Annual household income (log)	0.04	0.32	0.40*	0.18
Not employed	-0.74	0.43	-0.84**	0.28
Not employed female	0.91	0.60	0.13	0.37
Constant	13.17	19.07	8.81	7.11

**Table 10** continued

	East Germany		West Germany	
	<i>Coefficient</i>	<i>S.E.</i>	<i>Coefficient</i>	<i>S.E.</i>
Observations	251		719	
R-squared	0.065		0.058	

East and West Germany 2004–2005. Movers only

Significant at \*\*\* 99%; \*\* 95%; \* 90%

Source SOEP 23 matched with micromarketing indicators

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