Institute for FUTURES STUDIES

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Arbetsrapport/Institutet för Framtidsstudier; 2006:4
ISSN 1652-120X
ISBN 13: 978-91-89655-87-4
ISBN 10: 91-89655-87-7

Health as a factor in regional economic development

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Health as a factor in regional economic development[3]

Sammanfattning:

Är hälsa en bortglömd faktor för regional ekonomisk utveckling? Hälsan, eller ohälsan, hos den europeiska arbetskraften är en avgörande fråga när andelen äldre liksom medelåldern ökar. En annan orsak till att vi undersöker frågan är det ökade intresset för kopplingarna mellan hälsa och företags produktivitet. Ohälsa kan i detta sammanhang vara en stor nackdel för regioner där man vill öka den ekonomiska tillväxten. Ett tredje motiv är policyinriktat; en politik för att minska ohälsa kan vara ett viktigt verktyg i arbetet med regional utveckling. För att undersöka hälsa som en faktor för regional ekonomisk tillväxt i Sverige använde vi data på regional- och individnivå. Resultaten pekar tydligt på hälsa som en bestämmande faktor för regional ekonomisk tillväxt. Det visar sig först genom en stark korrelation i regionala data mellan hälsonivåer och ekonomisk tillväxt. Kommuner med frisk befolkning har generellt sett en starkare lokal ekonomi än de som karaktäriseras av en sjuk befolkning. Utöver detta påvisas negativa effekter i svenska mikrodata. Vid sjukdomsfall i vår kontrollgrupp påverkas inte bara individerna själva negativt utan även deras sambo, barn och arbetskollegor.

Abstract:

Is health a forgotten factor in regional economic development? The health or ill health of the European workforce is a crucial issue as the share of old age people as well as the mean age increases. A second reason for this paper is the increased interest in the relation between health and productivity of businesses. Ill health might in this respect be a factor of severe disadvantage for regions to improve their economic performance. A third motive is policy considerations; policies directed to reduce ill health could be considered as an important tool in regional development. In order to explore health as a factor for regional economic development in Sweden we used regional as well as micro level data. The results consistently highlight health as an important determinant of regional economic performance. It is first revealed through a strong correlation in regional data between health levels and economic performance. Healthy municipalities generally have a stronger local economy than those characterised by ill health. In addition a negative effect of ill health is demonstrated in Swedish micro data. In case of sickness in our control group, both the individuals themselves, their spouses, children and colleagues are negatively affected.

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[3] Projektet Hälsa som drivkraft för regional ekonomisk utveckling finansierades av Statens Folkhälsoinstitut.

Health as a factor in regional economic development

The focus of this paper is on health as one potential determinant of regional economic performance. Our interest in this issue has three motives. First, population aging will not only increase the share of old age people in the population. Lower birth rates across most European countries also imply that the mean age of the working age population will increase. Ill health among older workers can, therefore, have severe consequences for the labor supply in many European regions. A second motive is the increasing interest in different research fields of the relation between health and productivity. Positive effects of health on productivity have been demonstrated both for individuals, nations and, in recent research, also on the firm level. Poor health, thus, can be a factor that makes it difficult for disadvantaged regions to improve their performance. Policy considerations provide a third motive. In many countries, traditional policies have failed to eliminate persistent regional differences in economic well being. This opens up for a discussion about alternative strategies. With this paper, we would like to raise the issue if different policies aimed at reducing ill-health should be added to the policy-portfolio currently considered in relation to poor regional economic performance.

In the literature on regional economic performance, health issues have been given little attention. The purpose of this paper is, therefore, to outline a possible approach to the question of how health can play a role in shaping regional change. The starting point will be a review of the emerging literature on health as a positive factor for productivity and economic performance. Next, using Swedish data, we demonstrate a close correlation between regional economic weakness and regional ill health. This correlation, however, doesn’t say anything about the causal relations between health and wealth. The analysis on the regional level, therefore, is complemented by a study using micro data to assess the impact of sickness on economic outcomes on the individual, household, family and firm level.

1. Health and Wealth

In the 1970s and early 1980s research in economic geography was dominated by an approach that focused on the labor requirements of firms as an essential determinant of locational behavior (Walker and Storper 1981; Storper and Walker 1983; Massey 1984; Scott 1988). Since the mid-1980s, however, interest in labor has been supplanted by approaches that stress the importance of inter-firm, and inter-organizational relationships for regional competitiveness (Amin and Thrift 1992; Cooke and Morgan 1993; Saxenian 1994; Storper and Scott 1995; Gordon and McCann 2000; Malmberg and Maskell 2002). At the same time interest in labor issues suffered a set –back (Herod 1997; Smith 2000; Berndt and Fuchs 2002). The adoption of a health perspective on regional development underscores that labor again is seen as a pivotal element in the process of economic development.

One important stimulus for a renewed interest in the role of labor comes from research on the role played by demographic change in the acceleration of economic growth in Eastern Asia. As has been shown by David Bloom and his colleagues, the rapid growth of the East Asian economies can, in large part, be attributed to a favorable development of the working age population in relation to other age groups as a result of declining fertility (Bloom, *et al.*, 2003b). This "demographic gift" is not the only factor of importance, though. Numerous studies of cross-country data have also demonstrated that life expectancy is one of the best predictors of subsequent economic performance (Knowles and Owen 1995; Rivera and Currais 1999; Bhagava, Jamison et al. 2001; Gallup and Sachs 2001; Mayer 2001; Mcdonald and Roberts 2002; Bloom, Canning et al. 2004; Echevarria 2004; Zhang and Zhang 2005). Thus, the well-established fact that rising living standards have reduced mortality must be complemented by the acknowledgement that reductions in mortality also have played a role in triggering economic growth.

In economics it is not always the case that theoretical and empirical results support each other. However, theoretical support for the idea that lower mortality contributes to economic growth is at least as strong as the empirical evidence (Ehrlich and Lui 1991; de la Croix and Licandro 1999; Kalemli-Özcan, Ryder et al. 2000; Blackburn and Cipriani 2002; Boucekkine, de la

Croix et al. 2002; Kalemli-Özcan 2002; Bloom, Canning et al. 2003; Kalemli-Özcan 2003; Lagerlöf 2003). Two mechanisms have been explored. One is the effect of increased longevity on the demand for education. As life expectancy increases investment in education becomes more profitable. And this in turn stimulates economic growth. The second mechanism is that lower mortality stimulates saving. The extension of life expectancy implies that more people expect to live into old age. To provide for their consumption during this period of life they increase their level of saving during working life.

Health economics is another field of research that has produced studies that point to health as an important determinant of regional prosperity. In this field much attention has been given to the effect of ill health on earnings, see section 3.3.1 in (Suhrcke, *et al.*, 2005). Lower earnings are the result both from reduction in working-hours and from a decline in the level of compensation. Since illness reduces an individual's ability for work the effect on labor supply is not surprising. Lower levels of compensation, on the other hand, indicate that individuals struck by illness are forced to change job, have to revise their career plans, or, possibly, are punished by their employer because of lower productivity.

Certainly, these effects of ill health imply a negative effect on the competitiveness of regions where the working age population is less healthy. In these regions the aggregate supply of first-class labor will be lower than in regions with a healthy working-age population. A possible effect is that firms can be reluctant to establish themselves in regions where the level of ill health is high.

The negative effect on firms of ill health has recently been researched in a number of studies focusing primarily on conditions in the United States. One reason that this field hasn't yet been as intensively researched in Europe could be that many US employers bear the cost not only of employee absenteeism and reduced productivity, but also have a direct responsibility for sickness benefits and health care costs. What these studies show is that illness has significant negative effects on workforce productivity. Absenteeism is an important factor here but also what in this literature is called presenteeism. That is, employees that are unhealthy but still show up at work although they are not able to work at full capacity. One study estimates that,

on average, ill health can reduce the effective workforce of a firm by as much as 10%. (Berger, Howell et al. 2003). Another study finds that during a two-week period, 13% of the US labor force loose some productive time due to pain conditions (Stewart, Ricci et al. 2003), a result that is supported by (Pizzi, Carter et al. 2005). Workers with depression report a loss of nearly 6 hours of productive time per week. In the control group lost productive time was 75% lower (Stewart, Ricci et al. 2003). Similar results are reported by (Adler, Irish et al. 2004; Marciniak, Lage et al. 2004). A study of special significance to regional considerations is (Boles, Pelletier et al. 2004). They show that employees with higher health risks report higher levels of impaired performance on the job. If this result can be generalized to the regional level it implies that firms in regions with high levels of ill health will tend to have employees that are less efficient than employees in regions where the health situation is superior. Bad health, thus, is a condition that can hurt the competitiveness of a region.

2 The correlation between ill health and economic performance at the regional level

The aim of this section is to demonstrate a correlation between health and economic performance using Swedish data. If health is a determinant of economic performance such a correlation should be present. Many studies on micro level have, as shown in the previous section, demonstrated this relationship. However, there are fewer studies between health and economic performance on the regional level.

Nevertheless, there are studies in the tradition of medical and health geography where regions/communities are taken into account. There is one stream of epidemiological research, mapping and modeling disease and health. In the UK, Cliff and his collaborators dominate this field (Cliff and Haggett, 1988;1989). There are also studies of overall health where geographical variance is mapped (e.g. Shouls, *et al.*, 1996) and studies of inequality and health (Subramanian and Kawachi, 2004).

A composite index of regional economic weakness

Traditionally, regional performance has been defined as the increase or decrease of the population. This indicator has been used in the Nordic countries, as migration from sparsely populated areas denote economic weakness. However, in this paper where the focus is on how differences in health may affect regional performance a measure based on demographic indicators is less appropriate. Instead the hypothesis is that ill health can have a negative effect on the economic situation.

The indicators we have chosen are: *income* as it is a measure of the economic strength or weakness of the municipality. *Unemployment* as it is an indicator of the situation on the labor market. The development of *employed* is another indicator, which is related to the population in working ages, i.e. the degree of employment. (Lundmark, 2000) In this study the frequently used GNP measure may be misleading in that capital intensive businesses show high GNP per capita. This is particularly true for e.g. the paper mill industry in the northern parts of Sweden. In addition the choice of unemployment and income data has the advantage of possible policy implications.

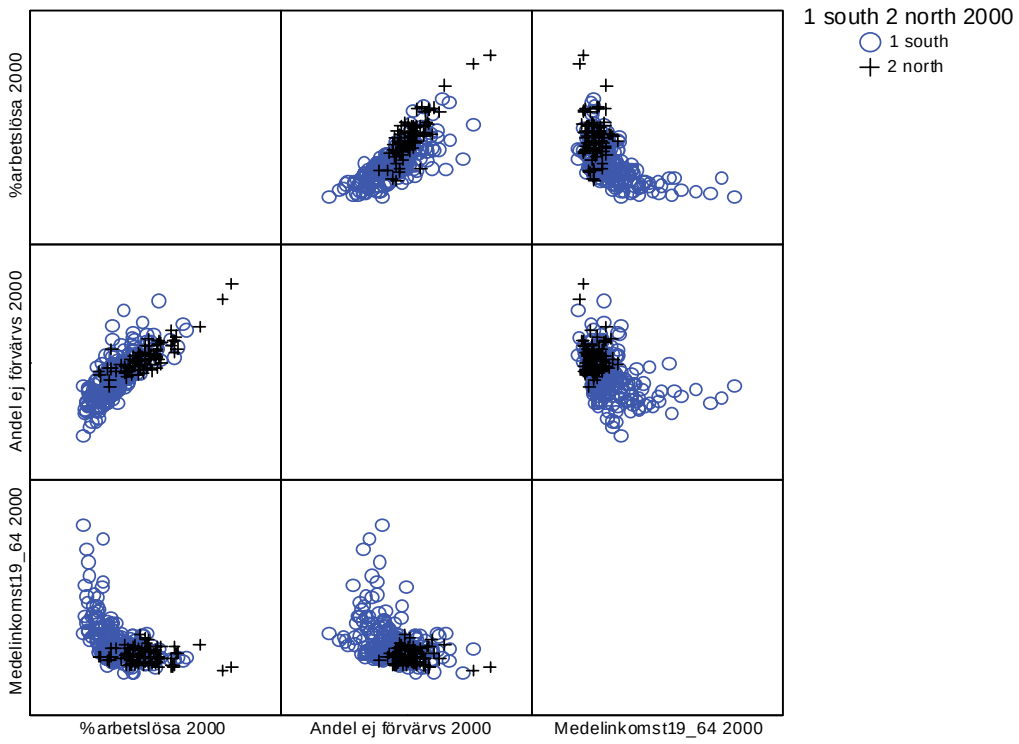

Fig. 1. Correlation matrix for variables of regional economic development, unemployment, not employed and income, and in addition for municipalities in northern Sweden a + and O for municipalities in southern Sweden. (Haparanda and Danderyd municipalities are omitted).

Unemployment is positively correlated to not employed (0,792**) and a north - south pattern is evident, Fig. 1 (municipalities belonging to the Swedish north have the marker + and south have the marker O). The uppermost cross (+) is the municipality Pajala in Norrbotten county and the bottom circle (O) is Gnosjö. Unemployed and income is correlated (-0,544**) and Lidingö has the highest average income.

As there is significant overlap within this group of variables we created an index. There are different ways of creating indexes. Our approach was to weight the index to include as much variation as possible, which was obtained by a principal component analysis. They are weighted to include as much variation as possible and range between 0 and 100. 0 equals the economically strong municipalities and 100, economic weakness. The three variables are given equally high loading.

The index of economic weakness is mapped in Fig. 2. The story derived from the map is that of economic weakness in sparsely populated areas in the western parts of middle and north Sweden. The same holds for a number of municipalities dominated by a declining manufacturing industry: e.g. Eskilstuna, Flen and Norrköping south west of Stockholm. We also find municipalities of economic weakness in the old iron industry district in mid-Sweden north of Sweden's largest lake Vänern.

Central parts of the Gothenburg and Malmö metropolitan regions are still suffering from a restructuring that started around the 1970s. They were traditional centers of the now dismantled Swedish shipbuilding industry. However, there are at the same time strong suburban parts of the metropolitan regions.

Municipalities that also appear economically strong on the map are in the small industrial district in the western parts of south Sweden. Here one of the municipalities, Gnosjö, is famous for its special setting of entrepreneurs and successful companies. It is also clear from the map that the coastal areas of northern Sweden perform better than the interior. The coastline has some exceptions with centers of declining forestry industries.

A composite index of regional ill health

In this paper are included Swedish data from different sources. From the population register there are mortality data, i.e. life expectancy and standardized death rates, Table 1. These variables bring together different aspects of health straightforwardly and accurately. In addition there is income data, sickness benefit and early retirement from the longitudinal education, labor and employment register. A third source is specific medical data on alcohol and COL (smoking) related deaths.

Table 1. Correlation matrix for health variables; sickness benefit, early retirement, life expectancy, standardized death rate, alcohol related deaths and COL for municipalities in Sweden. (Danderyd and Haparanda municipalities are omitted).

Correlations

	Sickness benefit	Early retirement	Life expectancy	Std death rate	Alcohol related deaths	COL related deaths
Sickness benefit						
Early retirement	0,738**					
Life expectancy	-0,542**	-0,605**				
Std death rate	0,250**	0,358**	-0,530**			
Alcohol related deaths	0,057	0,187**	-0,338**	0,290**		
COL related deaths	0,046	0,103	-0,194**	0,163**	0,098	

** Correlation is significant at the 0,01 level (2-tailed)

The correlation matrix in Table 1 shows correlations for health variables for Swedish municipalities. In summary the relationships between sickness benefit, life expectancy, and early retirement is strong. Mortality is linked to income data. It has been suggested that income indicators are not evidence of ill health but adaptation to the benefit system (Frykman and Hansen, 2005; Statens Offentliga Utredningar, 2005). Our results to a large extent contradict this view.

Then again the relationships between COL and alcohol related deaths on the one hand and sickness benefit, early retirement and life expectancy on the other, is nearly random variation and is not to be used in isolation. (Variables arranged according to magnitude of correlation in Table 1.)

High correlation between different indicators and the possible influence of measurement errors implies that a composite measure can give a better description of the Swedish health landscape than a measure based on a single indicator. Again, we have chosen to employ the principal component analysis. Here 0 equals municipalities in good health and 100 unhealthy. In the index of ill health, the factors sickness benefit, early retirement and life expectancy at birth are given high loading while COL and alcohol related deaths together with standardized death rates are given lower loading.

When the index of ill health is mapped the first impression is a north – south division of Sweden, Fig. 2. The northern municipalities have higher values of ill health than the southern ones. It is thus notable to remember that the geographically and visibly large, northern municipalities (2/3 of Sweden) hold just 20% of the total Swedish population of 9 millions (2004).

A closer look at map b) in Fig. 2 makes evident a strikingly similar pattern as to the map a) of economic weakness. The sparsely populated areas in the western parts of middle and north Sweden are coming out badly. Ill health, as well as economic weakness, prevailed in a number of municipalities dominated by a declining manufacturing industry south west of Stockholm. The same held for the old iron industry district in mid-Sweden, north of Sweden's largest lake Vänern.

The picture was more or less the same for central parts of the Gothenburg and Malmö metropolitan regions, with restructuring, traditional centers of the now dismantled Swedish shipbuilding industry.

Like the map of economic performance there are strong suburban parts in the metropolitan regions. Studies from Statistics Sweden support our findings. The highest number of years in good health is found in the metropolitan regions. In the early 1980s the share of daily smokers was highest in the metropolitan regions (38% men and 30% women) but leveled out throughout Sweden till 2001/02 (Persson, *et al.,* 2004). The habit of exercising do not particularly differ between regions in Sweden but a decreasing number of people "almost never exercise" year 1980/81 compared to 2002 (Persson, *et. al.,* 2004, p. 42). Overweight is equally widespread across Sweden while obesity is more common outside the three metropolitan regions. However there are some exceptions. For instance some southern suburban municipalities off Stockholm have higher rankings of ill health.

The same pattern, as for economic performance, is true for the small industrial district in the western parts of south Sweden. This is an area were municipalities perform well on the health and economy indexes. For the index of ill health the coastal areas of Northern Sweden is to

some extent better off than the interior.

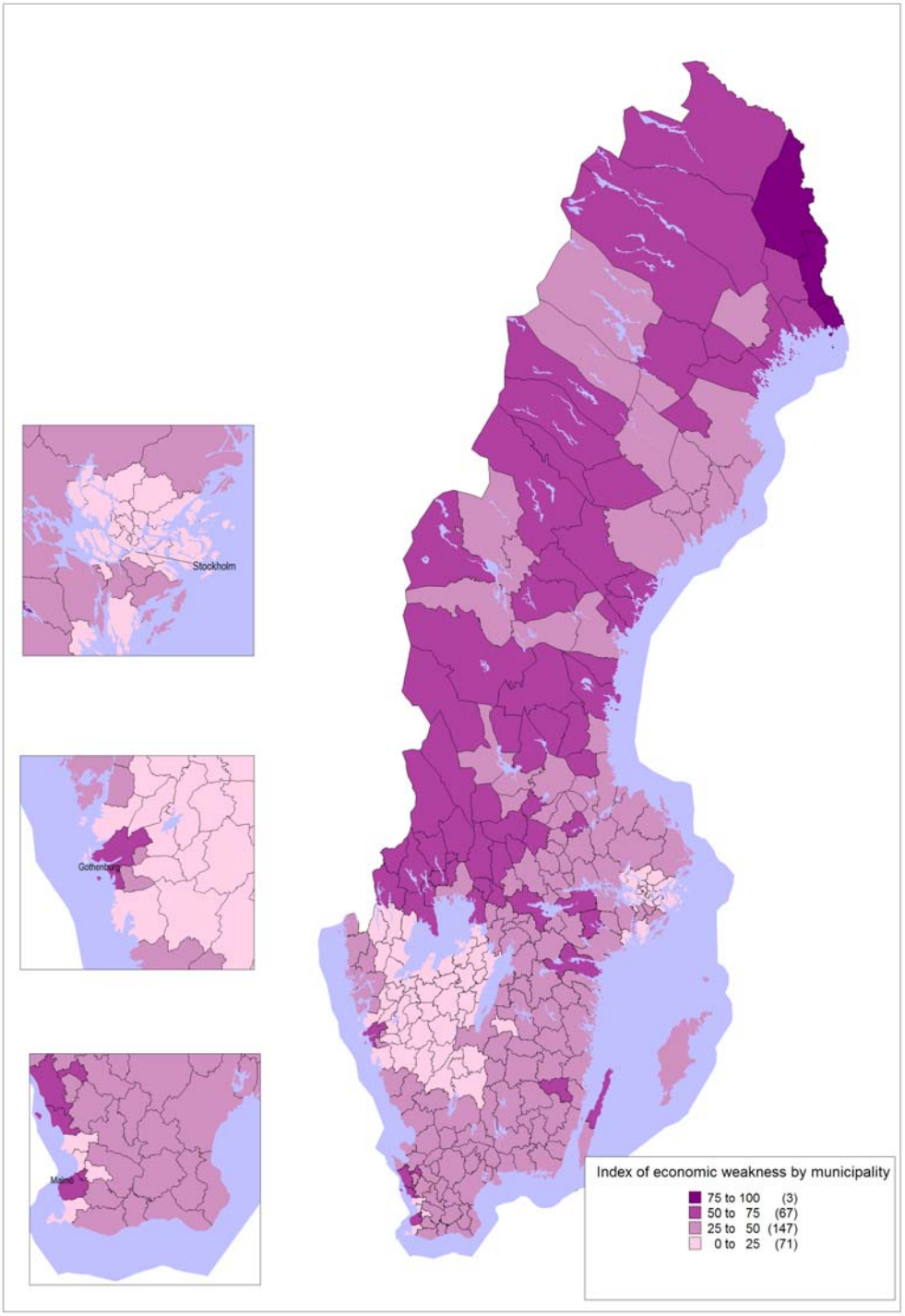

Fig. 2. a) Map of index of economic weakness by municipality.

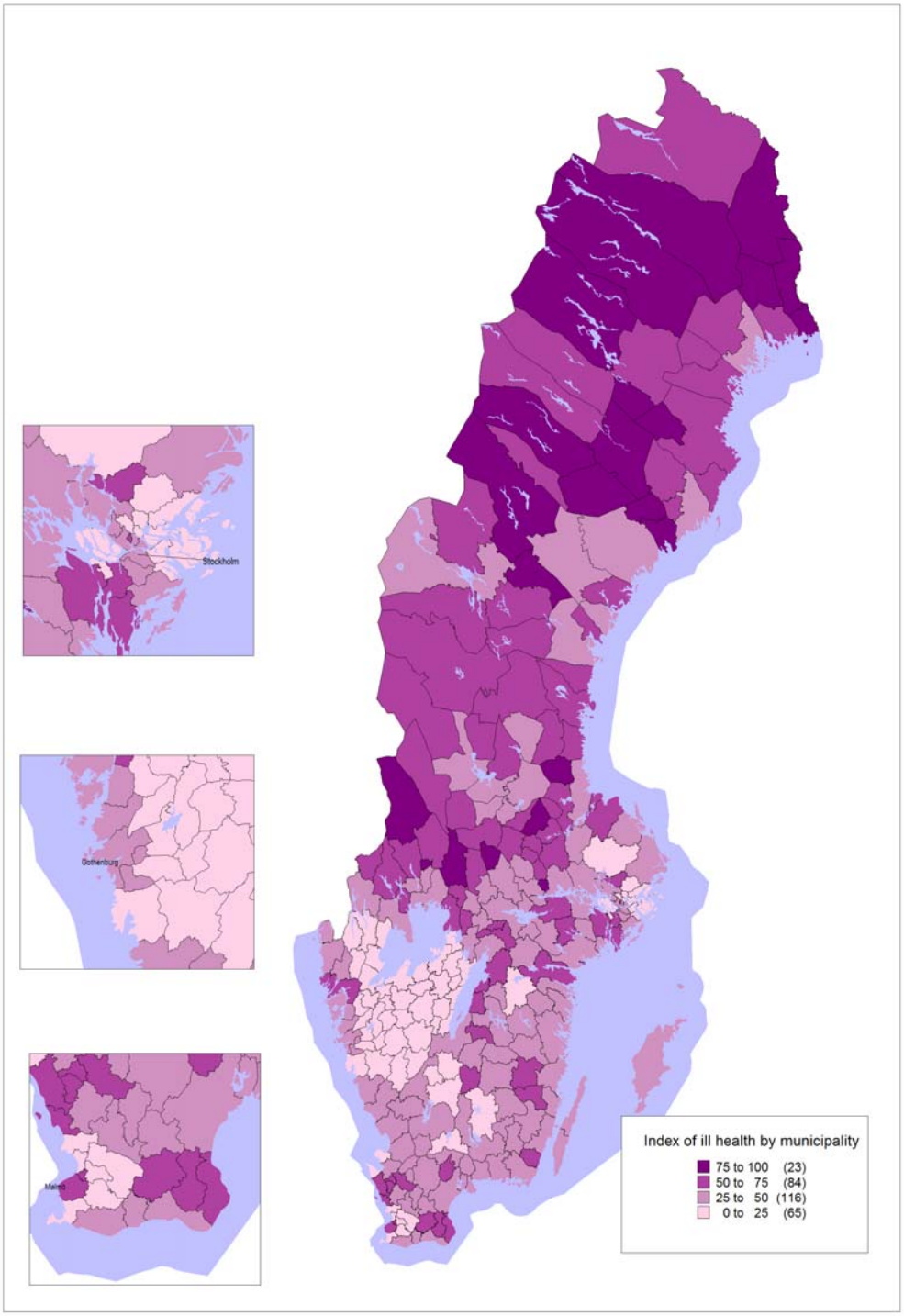

Fig. 2 b) Map of index of ill health by municipality.

The combined picture of economic weakness and ill health

The map comparison suggests a strong correlation. That this is indeed the case is shown in Fig. 3. The correlation coefficient between the economic weakness indexes and ill health is high, 0,683 (sig. 0,01-level). The diagram with the indexes shows much of a north/south and rural/urban pattern. We find municipalities in the Stockholm region with low rankings of ill health and economic weakness whereas the municipalities with the top ranking of ill health and economic weakness are found in the north (e.g. Övertorneå, Pajala). There is however no description without exceptions and the southwestern parts of Sweden include well performing rural areas as well, although not as sparsely populated as the most northern municipalities.

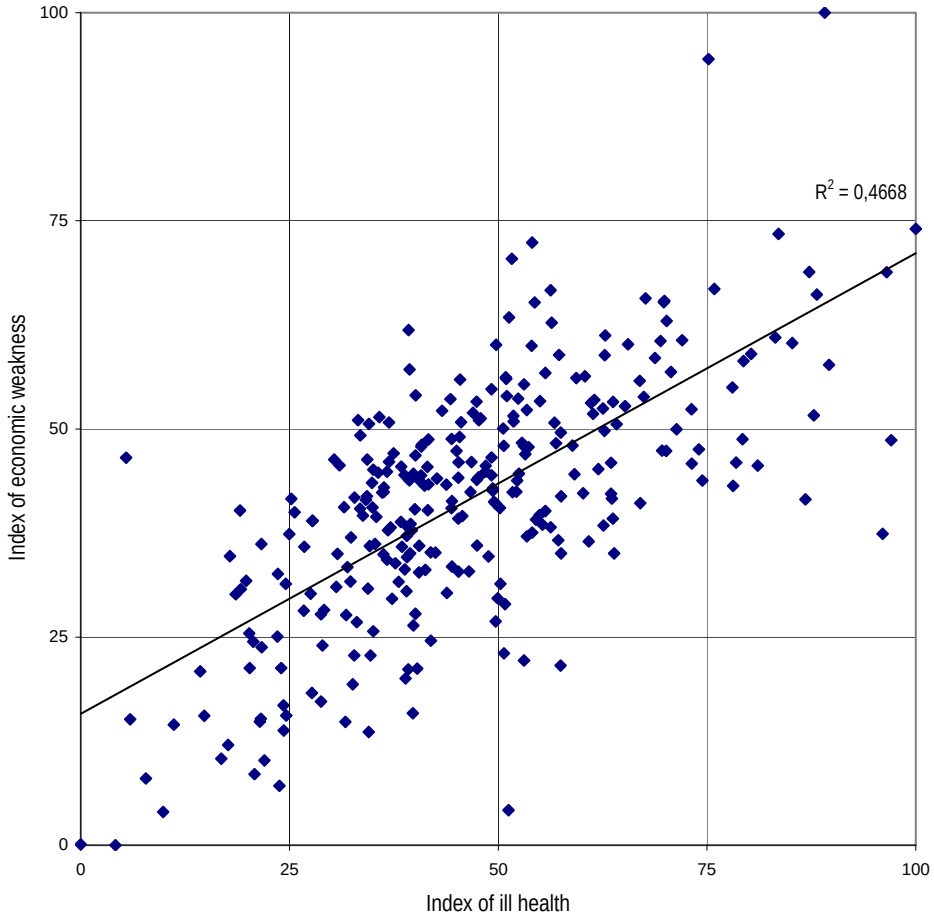

Fig. 3. Index of economic weakness and ill health by municipality.

3 The impact of sickness on individuals, spouses, children and colleagues—evidence from a longitudinal study

The strong correlation between community ill health and economic weakness demonstrated in the above section can be interpreted in two ways. One is that ill health has a negative effect on economic performance. Another is that economic well-being is a key determinant for population health. A third interpretation is that the effect goes both ways. This would imply that processes of improvements or decline in health and economic performance reinforce each other and that this processes of reinforcement is one reason for the strength of the statistical correlation. Given that strong theoretical arguments can be given for effects in both directions, the third alternative can be seen as the most promising position. An important question is, however, if it is possible to use micro-level data to demonstrate that cases of ill health can produce unfavorable economic outcomes for the affected individuals, as well as their for spouses, children, and colleagues.

In this paper we will use the PLACE (2004) database at Uppsala University to address this question. The PLACE database is based on the Swedish population register in combination with information on education, residence, employment and income. It consists of all individuals living in Sweden with one record per year for the 1990 to 2000 period. A unique identity code makes it possible to link records of the same individual to each other. With PLACE it is, thus, possible to to construct 11-years long histories of employment and income careers. Moreover, PLACE contains a family code that makes it possible to link spouses to each other; a parental code that allows a linkage of children to parents; and a workplace code that allows identification of people that work in the same place.

PLACE does not contain any medical information on illness. The income records, however, does give information on the amount of sick benefits individuals have received from the Swedish insurance office each year. Since the sick insurance includes all employed Swedes this figure can be used to assess the incidence of illness among people that have a job.

The richness of the PLACE data makes it possible to consider different designs for a study of

the economic effects of illness. Our guiding principle has been to construct a dataset that, as far as possible, allows a control of factors other than illness that can have an effect on the economic situation of an individual. This has led us to the following design.

First, we identify a cohort of individuals of the same age that have had a continuous attachment to the labor market. Our choice fell on the cohort born in 1945. This group was 45 years old in 1990 and 55 years old in 2000. A focus on this age bracket is interesting since this is an age were health problems associated with higher age begin to increase. At the same time, in Sweden few people start retiring before the age of 55. This implies that reduced labor supply for this cohort should not be influenced by the retirement of healthy individuals. Moreover, to ensure that we were analyzing a cohort of working individuals, people not having registered labor income for every year between 1990 and 1995 were excluded.

Second, a more stringent requirement was that the study cohort should only contain individuals that during the 1993-1995 had received no sickness benefits. This requirement was added because we wanted to be able to compare the economic outcome of sick individuals with a period when they were not affected by an illness that led to an extended period of work absence.

Third, we chose *receiving of sickness benefits from the Insurance Office in 1996* as our criteria for distinguishing between healthy individuals and individuals struck by ill health. This implies that our study is based on a comparison of individuals who at age 51 was struck or not struck by relatively severe illness. The reason why receiving of sickness benefits from the Insurance Office can be seen as an indicator of relatively severe illness is that in 1996, this kind of benefit was not paid until after 14 days of illness. During the first two weeks of illness the employer paid sickness benefits. Focusing on illness in 1996 has the advantage that we both can observe individuals for some years before they are struck by disease and also that the PLACE data allow us to observe them for several years after the incidence of relatively severe illness.

Given this identification of the cohort, following up the effect of illness is straightforward. The basic procedure is to analyze the development over time for different economic outcome

variables and compare the results for sick and non-sick both before and after the incidence of illness in 1996.

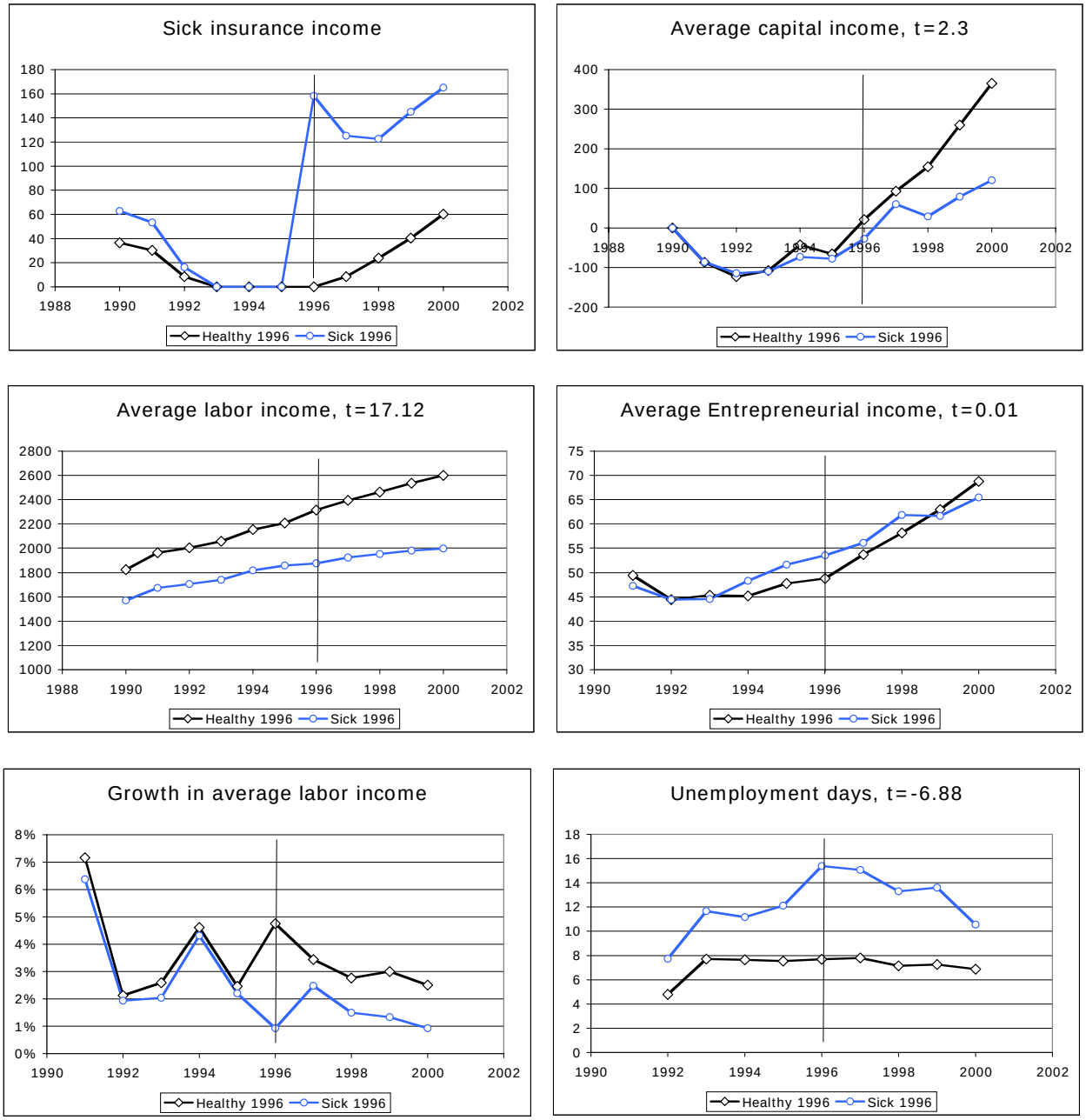

Fig. 4. The effect of sickness on sickness insurance income, labor income, growth in labor income, capital income, entrepreneurial income, and unemployment days. The t-values are for the effect of sickness during the 1996-2000 period, controlling for time and group effects.

The result of such a comparison is illustrated in Fig. 4 Here six different outcomes are

presented: Sick insurance income, labor income, growth in labor income, capital income, entrepreneurial income, and unemployment days. The sick insurance graph gives a good illustration of how the sample has been constructed. During 1993, 1994, and 1995, no-one in the sample receives any sickness compensation from the Insurance Office. This is true also for the non-sick in 1996; whereas the sick group got an average of 16,000 SEK in sick compensation in 1996 (the scale is in 100' SEK). As can be seen in the Fig. 4, the sick group continues to receive substantial sickness compensation also after 1996. The continuous receiving of sick compensation after 1996 supports the view that an illness that generates sick compensation is relatively severe.

From the second graph it is evident that the sick group has lower labor income than the non-sick group already before sickness strikes. This is not surprising given that low income is a risk factor for sickness. More interesting is the fact that before 1996 growth in labor income for the sick group is as fast as for the non-sick group. That is, as long as the sick group stays healthy, they are able to share in the process of rising income. After illness has struck, this is no longer the case. Then the sick group every year experiences a very much lower growth in labor income compared to the healthy group. The result is a growing gap in labor income from 1996 and onwards.

In the graph (Fig. 4), a t-statistic for a test of the effect of non-illness is also provided. The t-statistic obtained by the use of a non-illness dummy variable that is coded to 1 for both groups in 1993-1995 when neither group receives sick-compensation. From 1996-2000, the non-sick group is still coded to 1 but the sick group is coded –1. This non-illness dummy is then used in a regression that also controls for time effects (through the use of year dummies) and group effects (through the use of a dummy for belonging to the sick group). The t-statistics, thus, gives information if illness has a negative effect on labor income when a comparison is made with people that are sick-compensation healthy. In effect, the labor income of the sick group after the incidence of ill health is compared to the labor income of a group consisting of themselves before they were struck by ill health, and the group stayed healthy also in 1996. Moreover, this comparison is made when the over-all difference in labor income between the sick and non-sick group has been controlled for, as well as overall changes in labor income

over time. The t-statistic of 17.12, thus, confirms that the labor income of the non-sick group is positively affected by the fact that they didn't fall sick in 1996.

The fourth graph in Fig. 4 shows the effect of ill health on capital income. Since the early 1990s payments of interest and dividends are directly reported to the Swedish tax authorities. Data on capital income, thus, can give a good indication of the financial situation of an individual. The graph shows that before 1996, both groups had a negative capital income, a result of interest payments on household loans. After 1995, the non-sick group experiences a fast increase in capital income reflecting a net-accumulation of financial assets. Also the sick group manages to get a positive capital income but their rate of accumulation is very much slower.

From a regional perspective this difference is of considerable importance. Different studies have shown that the accumulation of capital is an essential pre-condition for successful entrepreneurship. If individuals struck by sickness have problems accumulating capital this implies a negative effect on the growth of new firms in regions where the level of ill health is high. Money saved for a rainy day can be invested in new businesses if the weather stays sunny. But if bad luck strikes these savings may have to be used to compensate for lower labor income. As shown in the fifth graph, however, our data does not allow us to pin-point any effect on entrepreneurial income.

The sixth graph, finally, shows that ill-health associated with a weakened position on the labor market. Already before they become sick, people in the sick group have, on average, more unemployment days. The same year that they become sick this difference increase, though. Over time the number of unemployment days falls back for the sick group, but it may be because they are leaving the labor force. Is higher unemployment in the sick group a cause or an effect of sickness? With our data this is difficult to tell. What this graph illustrates is, instead, that ill health, whether caused by unemployment or not, can be a factor that makes a return to employment more difficult.

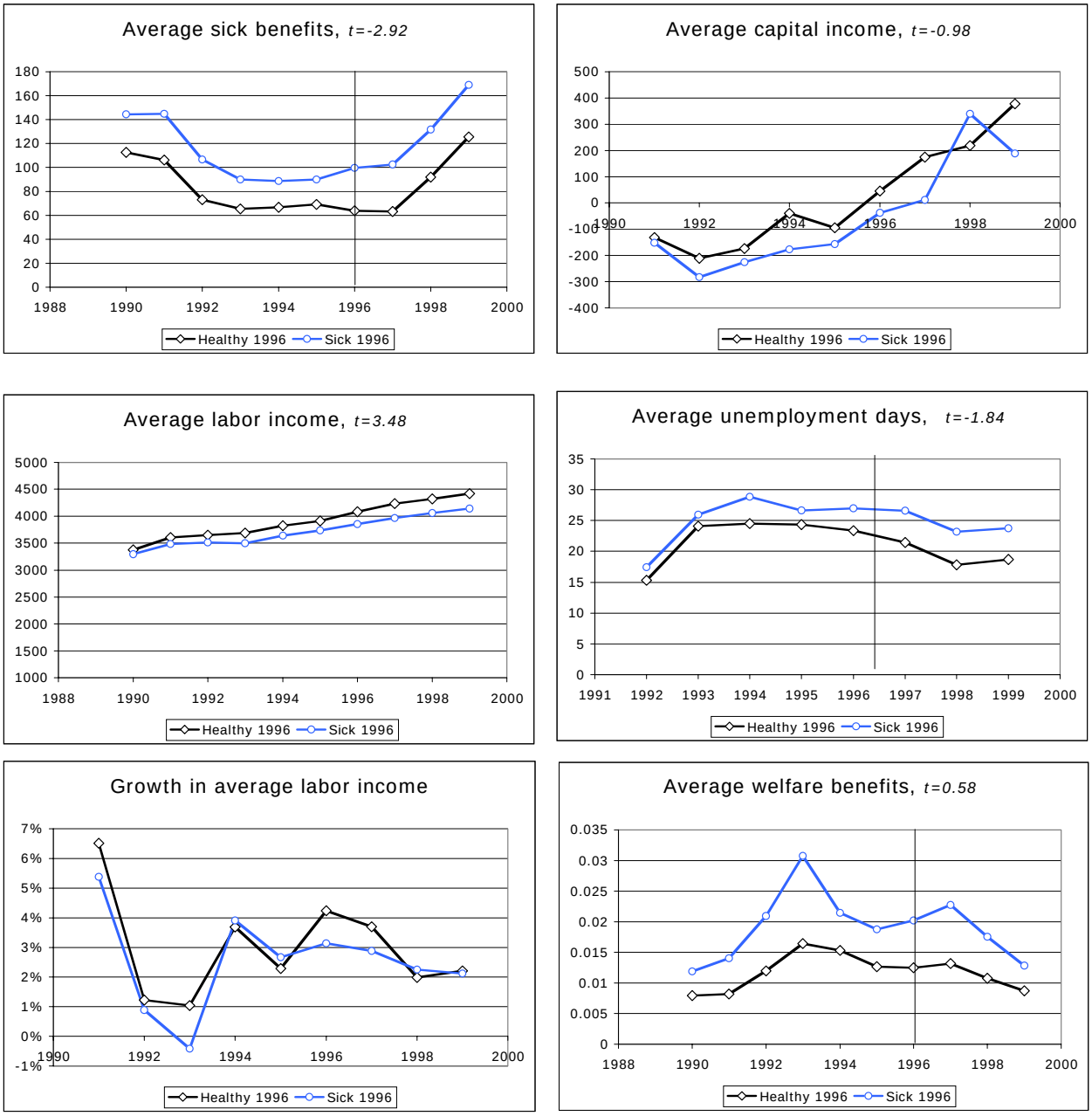

Fig. 5. The effect of sickness on spouses' sickness payment, labor income, growth in labor income, capital income, unemployment days, and welfare benefits. The t-values are for the effect during the 1996-1999 period, controlling for time and group effects.

In Fig. 5 the perspective is shifted from the individuals directly affected by illness to their spouses. As explained these can be identified via family identification code contained in the PLACE data. As expected, effects on spouses are not as strong as on the individual falling ill. But still, the effects are significant on spouses' sickness and labor income, and marginally

significant on unemployment. An explanation of these effects can be found in the literature on the effect on spouses of severe illness. A general finding is that illness generates high levels of stress in spouses and increased levels of psychiatric disorders like depression. An interpretation of the spousal effects is that they reflect the outcome of increased stress levels. It can be noted that the effects seem to be strongest in the first year of sickness and the year after. This is what should be expected if increased stress is the major mechanism behind the spousal effect.

Even if the spousal effect is not as strong as the individual effect it adds force to the argument that bad health can reduce the economic vigor of a region. The picture given here is that a stroke of sickness does have an effect that goes beyond the immediately affected person. It will also have the effect that spouses will not be able to give as much attention to their job as before.

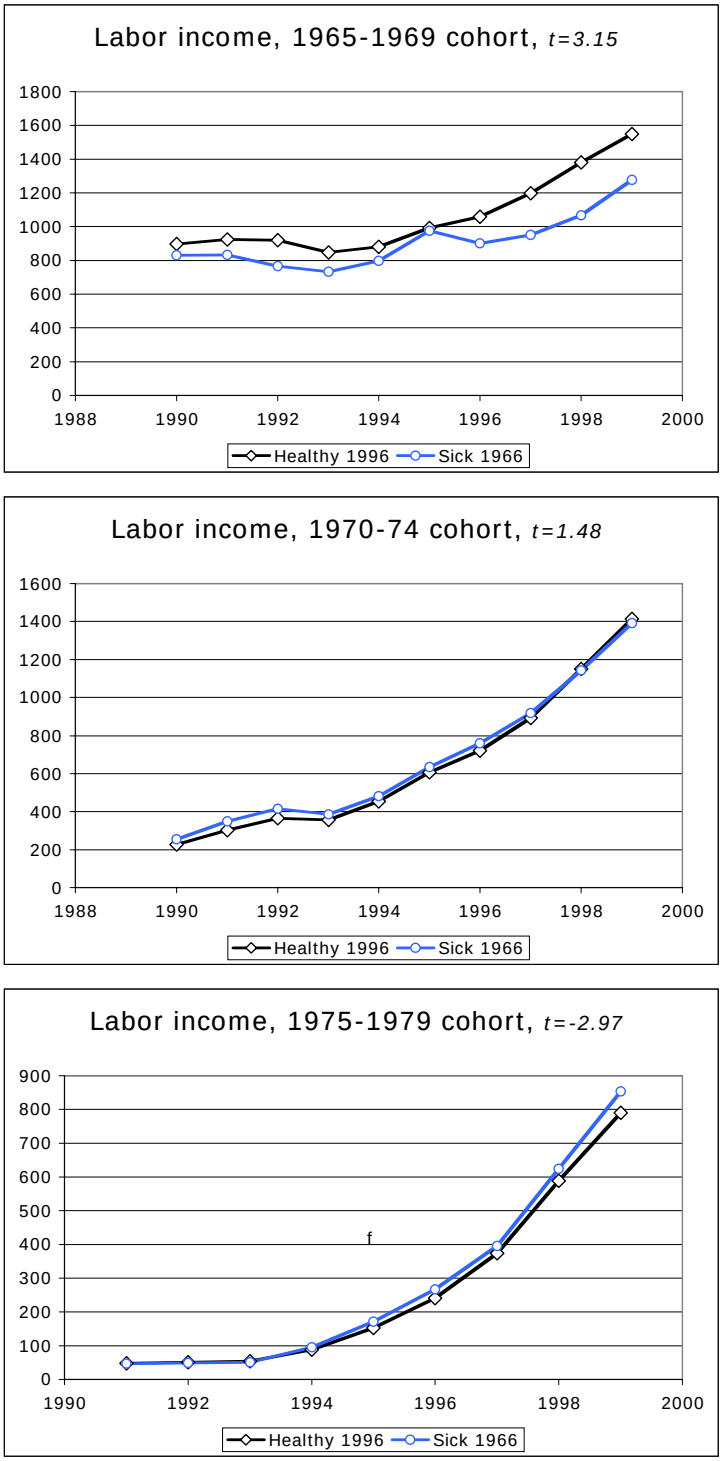

Fig. 6. The effect of sickness on children's labor income, by birth cohort. The t-values are for the effect during the 1996-1999 period, controlling for time and group effects.

In Fig. 6 the effect on the labor income of children is illustrated separately for children of different ages. Here there is a clear negative effect of a parent's ill health on the labor income of older children (aged 27-31 in 1996). For children ages 21-26 at the time of a parent's ill

health there is no significant effect, and for younger children (aged 17-21 in 1996) the effect on labor income is positive. The latter effect could be the result of children choosing work instead of education when parental support is reduced. But such a conclusion would require further controls before it can be established firmly. A possible mechanism behind the negative effect on older children's labor income is that reduced parental support forces children to choose jobs that are relatively less demanding in terms of, for example, length of commutes or extension of working-hours. In Sweden, most people in the 27-31 age bracket have, or soon will have, small children in the household. In such household the presence of grand-parental support may be essential for how much time adults can devote to paid employment.

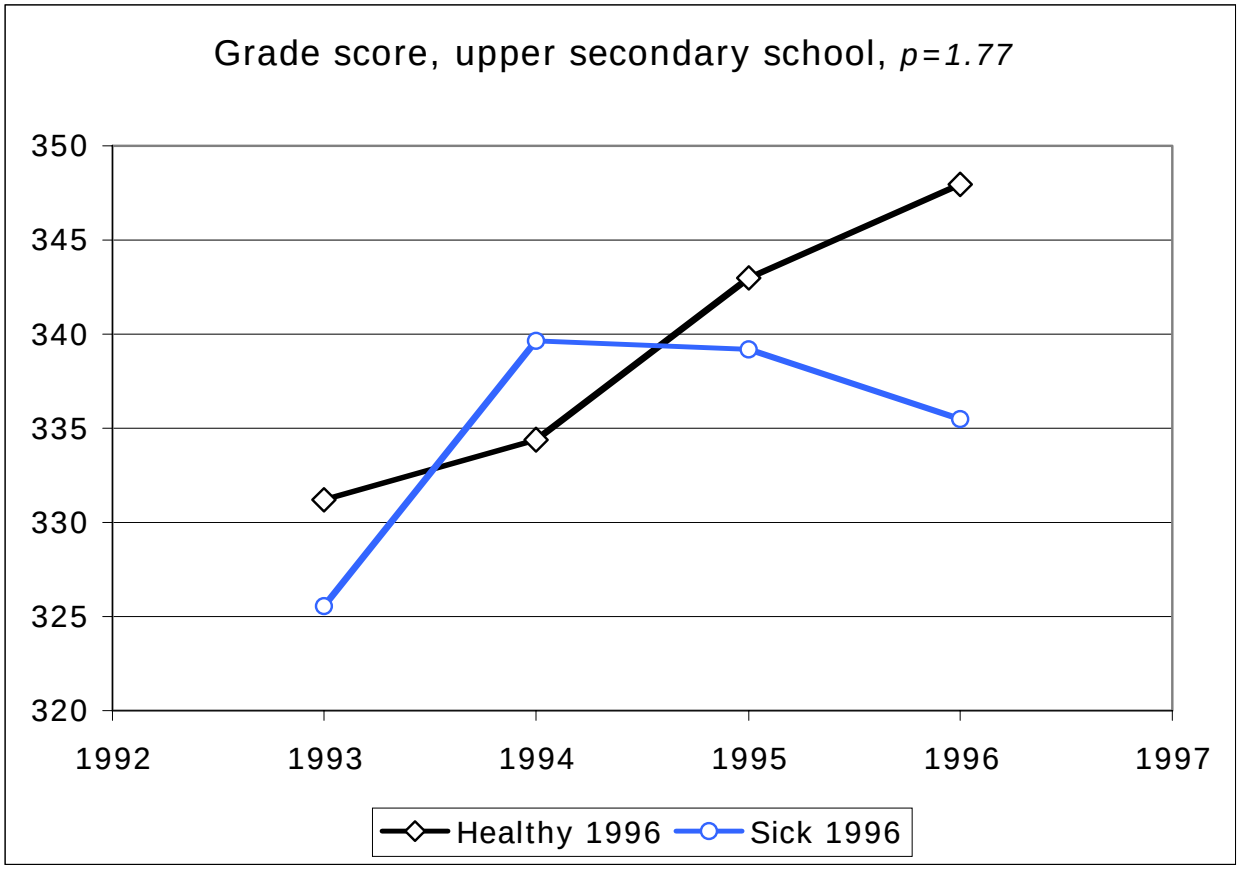

Fig. 7. The effect of sickness on children's upper secondary school grades, by year of examination. The t-value is for the effect in 1996, controlling for lower secondary school grades, time and group effects.

Fig. 7 illustrates another possible effect of parental ill health. Here upper-secondary-school

grades for children to the sick and non-sick group are illustrated. The relative scores of these groups vary in 1993, 1994, and 1995, but in 1996, the year of sickness, the gap widens. Not enough to make the difference fully significant, but the result indicate that parent's sickness can be a stressful event with possible negative repercussions on children's performance in school.

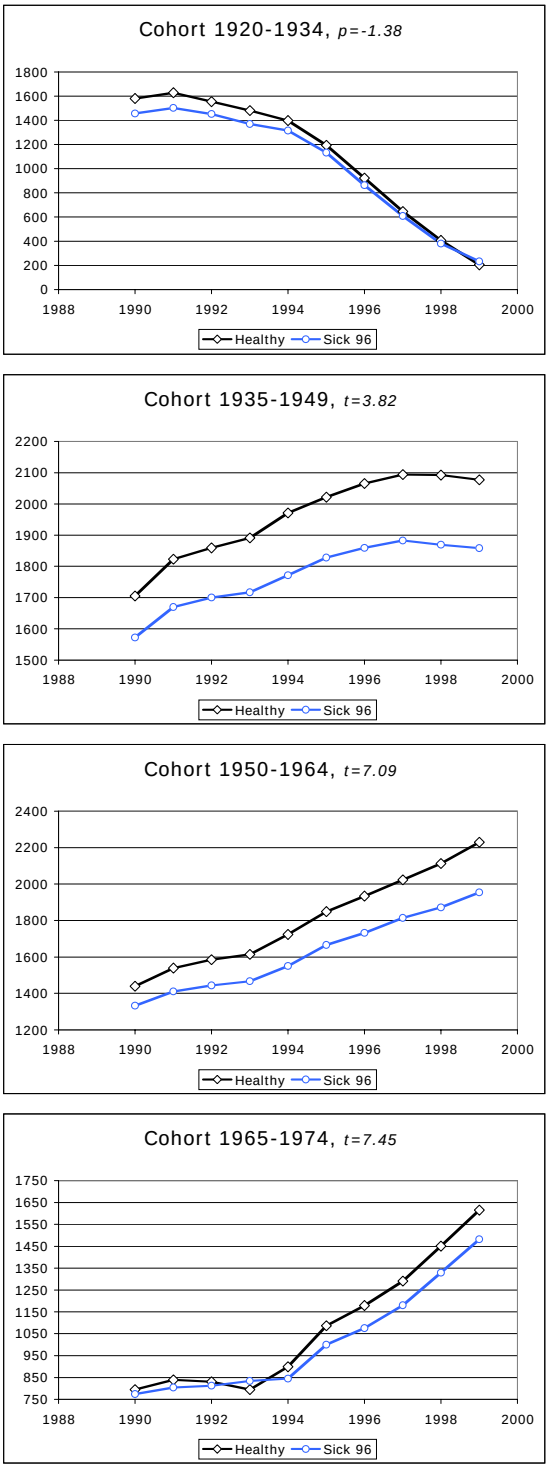

Fig. 8. The effect of sickness on the labor income of colleagues, by cohort. The t-values are for the effect during the 1996-1999 period, controlling for time and group effects, education and industrial sector.

In Fig. 8 the perspective shifts from family to colleagues of the sick and non-sick people in the sample. Colleagues have been defined on as the individuals who worked in the same work place as our sample individuals in 1995, the year before the sick group was struck by illness. The analysis here focuses only on the effect on labor income of having a colleague who is affected by a severe illness. Illness should not necessarily be expected to have any effect on the labor income of colleagues. If there is a perfect substitute that can be hired when a colleague becomes sick the effect should be negligible. However in a firm that has established a clear division of responsibilities it might be the case that sudden sickness can produce some disruption. In the present study we focus on workers that become sick at age 51. At this age many employees have established a relatively strong position at work, a position that can be based on the control of resources that are essential for continued efficient operations. Thus, a case of illness in the group under study here might have a negative effect not only on the individuals themselves and their family, but also on the productivity of the workplace and, by extension, on the labor income of colleagues.

As can be seen in the graphs of Fig. 8, such negative effects are indeed to be found in the data we have analyzed. Not for the oldest who were aged 62 and above at the time their colleague fell ill. Here, in fact, the effect is positive, albeit not significant. Could it be that a case of sickness among the most experienced workers forces the employer to as some “over-aged” employees to stay on a bit longer? But apart from these old employees the effect is negative and significant, and more strongly so for employees below 46 years of age when their colleague falls ill.

The individual effect is not very large. The point estimate is 1900 SEK lower annual income for employees of the 1935-49 cohorts, and between 2700 and 3000 SEK for the younger cohorts. What is noteworthy, though, is that the effect seems to be persistent. It is not only a characteristic of the year of illness and the next. Moreover, this is the cost imposed on each employee. Since the mean number of employees is around 22 this implies an annual cost for one case of sickness of around 50,000 SEK. This can be compared to the estimated 10,000 SEK effect on the annual labor income of the individual who is struck by sickness. In total, thus, it appears as if the largest economic effect of a case of illness is on colleagues, taken as a

group. Furthermore, if the effect, as suggested by the graphs in Fig. 8 continues for at least four years, the total cost for colleagues would add up to 200,000 SEK for a single case of relatively severe illness. This is not a negligible sum.

An argument against this analysis could be that the effect on the labor income of colleagues that we measure is not the result of having a sick colleague. Instead, both the negative effect on income and the sickness of a colleague could be caused by a third factor, for example, layoffs at their shared place of work. This could be an explanation since in establishments that suffered from more than 90% employment reduction and also between 20% to 50% employment reduction were somewhat more likely to have an employee from the sick part than from the healthy part of the 1945 cohort in 1995. However, eliminating establishment with these negative employment changes didn't change the pattern of negative income effect on colleagues' sickeness.

4. Conclusion

Although feminist geography has attained a strong position in the last two decades, much of the discussion about regional competitiveness is still ignoring gender issues. The old notion that business is a male sphere, thus, seems to be upheld in the literature (Pettersson 2002).

The evidence presented in this picture on the importance of health for regional productivity, to some extent, counters that view. Preserving and restoring health, have, historically, been a key responsibility for women. If it turns out that regional competitiveness presupposes a population in good health, this implies that a traditional female sphere of activity cannot any longer be ignored in discussions about how to promote regional development. Moreover, the longstanding ignorance of health issues in economic geography could be seen as a result of a dominating masculine perspective.

The evidence presented in this paper, however, consistently shows that health can be an important determinant of regional economic performance: Recent research on economic growth, firm productivity, and individual earnings has demonstrated that health improvements

have a strong positive effect on economic outcomes. This positive effect of health on wealth is supported by strong theoretical arguments. In Swedish regional data there is a strong correlation between health levels and economic performance. Healthy municipalities generally have a stronger local economy than municipalities charaterized by ill health. In addition, a negative effect of ill-health on economic outcomes can also be demonstrated in Swedish micro data. When sickness strikes both the individuals themselves, their spouses, children and colleagues are negatively affected.

The conclusions are that trajectories of improving or deteriorating health can play a key role in regional economic development. Health improvements can help to lift a region into a positive spiral of positive economic development. Negative health outcomes, on the other hand can hurt the productivity of firms and block positive economic development.

Thus, instead of ignoring health issues, development policies should be based on an assement of the health situation in different regions and on an analysis of what measures might improve the health situation. In many cases, it might prove more cost efficient to find policies that have a positive effect on health than it would be to stimulate the regional economy with tax breaks or direct subsidies. One reson for this is that health interventions often is the responsibility of the public sector that is under political control.

References

Adler, D. A., J. Irish, et al. (2004). "The work impact of dysthymia in a primary care population." General Hospital Psychiatry **26**(4): 269-276.

Amin, A. and N. Thrift (1992). "Neo-Marshallian Nodes in Global Networks." International Journal of Urban and Regional Research **16**(4): 571-587.

Berndt, C. and M. Fuchs (2002). "Labour geography: Towards an inter-disciplinary research agenda." Geographische Zeitschrift **90**(3-4): 157-166.

Berger, M. L., R. Howell, et al. (2003). "Investing in healthy human capital." Journal Of Occupational And Environmental Medicine **45**(12): 1213-1225.

Bhagava, A., D. T. Jamison, et al. (2001). "Modeling the effects of health on economic growth." Journal of Health Economics **20**(3): 423-440.

Blackburn, K. and G. P. Cipriani (2002). "A model of longevity, fertility and growth." Journal of Economic Dynamics & Control **26**(2): 187-204.

Bloom, D. E., D. Canning, et al. (2003). "Longevity and life-cycle savings." Scandinavian Journal of Economics **105**(3): 319-338.

Bloom, D. E., D. Canning, et al. (2004). "The effect of health on economic growth: A production function approach." World Development **32**(1): 1-13.

Bloom, D. E., D. Cunning, et al. (2003). The Demographic Dividend. A New Perspective on the Economic Consequences of Population Change. Santa Monica, CA, RAND.

Boles, M., B. Pelletier, et al. (2004). "The relationship between health risks and work productivity." Journal Of Occupational And Environmental Medicine **46**(7): 737-745.

Boucekkine, R., D. de la Croix, et al. (2002). "Vintage human capital, demographic trends, and endogenous growth." Journal of Economic Theory **104**(2): 340-375.

Cliff, A. D. and P. Haggett (1988). Atlas of Disease Distributions: Analytical Approaches to Epidemiological Data. Oxford, Blackwell Reference.

Cliff, A. D. and P. Haggett (1989). "Spatial aspects of epidemic control." Progress In Human Geography(13): 313-47.

Cooke, P. and K. Morgan (1993). "The Network Paradigm - New Departures in Corporate and Regional-Development." Environment and Planning D-Society & Space **11**(5): 543-564.

de la Croix, D. and O. Licandro (1999). "Life expectancy and endogenous growth." Economics Letters **65**(2): 255-263.

Echevarria, C. A. (2004). "Life expectancy, schooling time, retirement, and growth." Economic Inquiry **42**(4): 602-617.

Ehrlich, I. and F. T. Lui (1991). "Intergenerational Trade, Longevity, and Economic-Growth." Journal of Political Economy **99**(5): 1029-1059.

Fritzell, J., M. Nermo, et al. (2003). "The impact of income: assessing the relationship between income and health in Sweden." Scandinavian Journal of Public Health(32): 6-16.

Frykman, J. and K. Hansen (2005). Att leva på kassan. Allmän försäkring och lokal kultur, Försäkringskassan analyserar.

Försäkringskassan and http://uppsol.forsakringskassan.se/templates/Page.aspx?id=3779. (2005, 2005-03-18). "Ohälsotalet." Retrieved 2005-03-18, 2005.

Gallup, J. L. and J. D. Sachs (2001). "The economic burden of malaria." American Journal of Tropical Medicine and Hygiene **64**(1-2): 85-96.

Gordon, I. R. and P. McCann (2000). "Industrial clusters: Complexes, agglomeration and/or social networks?" Urban Studies **37**(3): 513-532.
Herod, A. (1997). "From a geography of labor to a labor geography: Labor's spatial fix and the geography of capitalism." Antipode **29**(1): 1-&.
Kalemli-Özcan, S. (2002). "Does the mortality decline promote economic growth?" Journal of Economic Growth **7**(4): 411-439.
Kalemli-Özcan, S. (2003). "A stochastic model of mortality, fertility, and human capital investment." Journal of Development Economics **70**(1): 103-118.
Kalemli-Özcan, S., H. E. Ryder, et al. (2000). "Mortality decline, human capital investment, and economic growth." Journal of Development Economics **62**(1): 1-23.
Knowles, S. and P. D. Owen (1995). "Health Capital and Cross-Country Variation in Income Per-Capita in the Mankiw-Romer-Weil Model." Economics Letters **48**(1): 99-106.
Lagerlöf, N. P. (2003). "From Malthus to modern growth: Can epidemics explain the three regimes?" International Economic Review **44**(2): 755-777.
Lundmark, M. (2000). Regional utjämning eller polarisering i Europa? Det nya samhällets geografi. S. Berger. Jönköping, Uppsala Publishing House**:** 247-267.
Malmberg, A. and P. Maskell (2002). "The elusive concept of localization economies: towards a knowledge-based theory of spatial clustering." Environment and Planning A **34**(3): 429-449.
Marciniak, M., M. J. Lage, et al. (2004). "Medical and productivity costs of anxiety disorders: Case control study." Depression And Anxiety **19**(2): 112-120.
Massey, D. B. (1984). Spatial divisions of labor : social structures and the geography of production. New York, Methuen.
Mayer, D. (2001). "The long-term impact of health on economic growth in Latin America." World Development **29**(6): 1025-1033.
McDonald, S. and J. Roberts (2002). "Growth and multiple forms of human capital in an augmented Solow model: a panel data investigation." Economics Letters **74**(2): 271-276.
Persson, J., I. Sjöberg, et al. (2004). Bruk och missbruk, vanor och ovanor. Hälsorelaterade levnadsvanor 1980-2002. Örebro, SCB, Statistiska centralbyrån, Statistics Sweden.
Pettersson, K. (2002). Företagande män och osynliggjorda kvinnor : diskursen om Gnosjö ur ett könsperspektiv. Uppsala, Kulturgeografiska insitutionen Univ. distributör.
Pizzi, L. T., C. T. Carter, et al. (2005). "Work loss, healthcare utilization, and costs among US employees with chronic pain." Disease Management & Health Outcomes **13**(3): 201-208.
PLACE (2004). Population, Chorology and Employment Database, Institute for Future Studies, Stockholm. from statistics Sweden.
Rivera, B. and L. Currais (1999). "Economic growth and health: direct impact or reverse causation?" Applied Economics Letters **6**(11): 761-764.
Saxenian, A. (1994). Regional advantage : culture and competition in Silicon Valley and Route 128. Cambridge, Mass., Harvard Univ. Press.
Scott, A. J. (1988). Metropolis : from the division of labor to urban form. Berkeley, University of California Press.
Shouls, S., P. Congdon, et al. (1996). "Geographic variation in illness and mortality: the development of a relevant area typology for SAR districts." Health & Place **2**(3): 139-155.
Smith, N. (2000). "What happened to class?" Environment and Planning A **32**(6): 1011-1032.

Statens offentliga utredningar. (2005). "Socialförsäkringsutredningen." 2005, from www.sou.gov.se/socialforsakring/aktuellt.htm.

Stewart, W. F., J. A. Ricci, et al. (2003). "Lost productive work time costs from health conditions in the United States: Results from the American productivity audit." Journal Of Occupational And Environmental Medicine **45**(12): 1234-1246.

Stewart, W. F., J. A. Ricci, et al. (2003). "Lost productive time and cost due to common pain conditions in the US workforce." Jama-Journal Of The American Medical Association **290**(18): 2443-2454.

Storper, M. and A. J. Scott (1995). "The Wealth of Regions - Market Forces and Policy Imperatives in Local and Global Context." Futures **27**(5): 505-526.

Storper, M. and R. Walker (1983). "The theory of labour and the theory of location." International Journal of Urban and Regional Research **7**(1): 1-43.

Subramanian, S. V. and I. Kawachi (2004). "Income inequality and health: what have we learned so far." Epidemiologic Reviews(26): 78-91.

Suhrcke, M., M. McKee, et al. (2005). The contribution of health to the economy in the European Union. Luxenburg, European Commission, Health & Consumer Protection Directorate-General.

Walker, R. and M. Storper (1981). "Capital and industrial location." Progress in Human Geography **5**(4): 473-509.

Zhang, J. and J. S. Zhang (2005). "The effect of life expectancy on fertility, saving, schooling and economic growth: Theory and evidence." Scandinavian Journal of Economics **107**(1): 45-66.

Appendix A. Table, variables and description, municipality level (values from year 2000).

Appendix variables on municipal level

Variables	Mean	Min	Max	Description
Income	125905	104409	339278	Average of disposable income for municipalities (*base amount)
Ln income				Logarithm of average income
Unemployed	0,0655	0,01	0,19	Unemployed/in program for individuals 16-64 yrs of population in municipality 16-64 years
Ln unemployed				Logarithm of share unemployed
Not employed	0,24	0,12	0,45	Share of individuals not employed 19-64 yrs of population in municipality 19-64 years.
Ln not employed				Logarithm of share not employed
Life Expectancy	79,7	75,8	82,7	Life Expectancy, 1999-2003 in yrs
Std death rate				Death rate controlled for age (national age structure as base)
Early retirement	0,1	0,04	0,18	Share of individuals 19-64 yrs of population in municipality 19-64 yrs with early retirement
Sickness benefit	5,7	1,16	10,7	Sum of sickness benefit by municipality as a share of disposable income
Alcohol related deaths	85,8	0	332	Alcohol related deaths 1997-01, 15-64 yrs
Chronic obstructive lung disease	12,3	0	77	COL deaths 1998-02, 15-64 yrs

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ISSN 1652-120X
ISBN 13: 978-91-89655-87-4
ISBN 10: 91-89655-87-7