Luxembourg Income Study Working Paper No. 269

INCOME INEQUALITY, THE PSYCHO-SOCIAL ENVIRONMENT AND HEALTH COMPARISONS OF WEALTHY NATIONS

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January 2001

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Revised 29th January, 2001

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Word Count: 4,000
Tables: 2
Figures: 2

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Summary

Background. The theory that income inequality and characteristics of the psycho-social environment - indexed by such things as social capital and sense of control over life's circumstances - are key determinants of health, and may account for health differences between countries has become influential in health inequalities research and for population health policy.

Methods. We examined cross-sectional associations between income inequality and low birth weight, life expectancy, self-rated health, and age- and cause-specific mortality among countries providing data in Wave III (circa 1989-92) of the Luxembourg Income Study. We used data from the 1990-91 wave of the World Values Survey (WVS) on distrust, belonging to organizations, volunteering, control, trade union membership and the proportion of women elected to national government from the UN Human Development Report. Life expectancy, mortality and low birth weight data were taken from the WHO Statistical Information System. Self-rated poor health was taken from the WVS.

Findings. Among the countries studied, higher income inequality was strongly associated with greater infant mortality ($r=0.69$, $p=0.004$ for females; $r=0.74$, $p=0.002$ for males). Associations between income inequality and mortality declined with age at death, and then reversed among those aged 65 and older. Income inequality exhibited inconsistent associations with specific causes of death and was not associated with CHD, breast or prostate cancer, cirrhosis or diabetes. Variations between countries in belonging to organizations, distrust and perceived control were unrelated to country differences in mortality at any age. However, countries that had greater trade union membership and political representation by women had better child mortality

profiles. Differences between countries in levels of social capital showed generally weak and somewhat inconsistent associations with cause-specific mortality. For instance, greater distrust was associated with lower CHD mortality among both females (r=-0.61, p=0.03) and males (r=-0.63, p=0.02).

Interpretation. Income inequality and characteristics of the psycho-social environment like trust, control and organizational membership do not appear to be key factors in understanding health differences between these wealthy countries. The associations that do exist are largely limited to child health outcomes and cirrhosis. Explanations for between-country differences in health will likely require an appreciation of the complex interactions of history, culture, politics, economics, and the status of women and minorities.

Keywords:

inequality, socioeconomic factors, social capital, population health

Introduction

There has been great interest in understanding links between income inequality and health.[1-5] Some studies have examined income inequality in regard to between-country health differences, [6,7] while others have analyzed associations of income inequality and health within countries.[8-10] Two distinct questions have been raised regarding associations between income inequality and health. First, for a given level of average income, is the extent of inequality in the distribution of income associated with differences in average levels of population health between countries or between regions (e.g., states) within a country? As an extension of this question, it has been proposed that the quality of the psycho-social environment - characterized by such things as social capital and sense of control over life - is the main explanatory mechanism for such associations.[1,7,11] While there is evidence at the individual level that psycho-social factors, like distrust,[12] control[13] and the quality of inter-personal relationships[14] affect health, there is little known about whether population-level analogs of these psycho-social factors explain health differences between countries. A recent study showed that such psycho-social indicators were not important in understanding between-country differences in self-rated health.[15] The second question is that if an association does exist between income inequality and health at the population level, to what extent is that association the mathematical result of the underlying association between income and health at the individual level.[16,17] Several within-US studies have investigated aspects of this.[17-20]

Our analyses investigate the first question. Is the extent of income inequality associated with average population health differences between wealthy countries? And, are between-country variations in indicators of the psychosocial environment associated with between-country health differences? The theory that income inequality, and its potential influence on

aspects of the psycho-social environment**,** can account for international health differences has become influential for interpreting health inequalities and in a number of countries has been embraced in policy documents focussed on strategies to improve population health.[3] Interest in the health effects of unequal income distribution was generated by the observation that income inequality was strongly associated with life expectancy among 9 OECD nations.[6] These data from the late 1970s and early 1980s showed that more unequal countries like the US and UK had lower life expectancy than more egalitarian Nordic countries. After publication of this provocative idea, concerns were raised about accuracy of the income data, contrary findings were published,[21] questioned,[22] and subsequently more studies published.[23-26] Despite the fact that these studies produced inconsistent findings, the theory that income inequality and its psychosocial effects are critical determinants of population health continues to be generally accepted and widely promoted.[27-30]

Important questions remain concerning the underlying empirical evidence to support claims that countries with higher levels of income inequality and poorer psycho-social environment have worse population health. Previous research has been based on small numbers of countries and limited health indicators, such as life expectancy - a synthetic, overall measure of population health which can mask differences in the age- and cause-of-death structure between countries. Across Europe, between-country differences in the cause-of-death structure have been shown to be important in interpreting differences in the extent of within-country health inequalities.[31-33]

We carried out the most complete international examination to date of associations between income inequality and low birth weight, life expectancy, self-rated health, and age- and cause-specific mortality among countries providing data in Wave III of the Luxembourg Income

Study (LIS). The LIS is widely regarded as the premier study of income distribution in the world.[34] We have also examined how aspects of the psycho-social environment such as distrust, belonging to organizations, volunteering (all proposed as measures of social capital)[35] and perceived control over one's life circumstances were associated with between-country variations in health. We also included data on belonging to trade unions and the proportion of women elected to national government, as indicators of class relations within the labour market and broader socio-political participation of women.[36]

Methods

Country Selection

Wave III (1989-1992) of the LIS provides the most recent, complete income inequality data available and includes 23 countries – Taiwan, Czech Republic, Hungary, Israel, Poland, Russia, Slovak Republic, Australia, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Luxembourg, Netherlands, Norway, Spain, Sweden, Switzerland, United Kingdom, and United States. Taiwan was excluded because health data were not available. We first examined income inequality and life expectancy among the remaining 22 countries. However, all subsequent analyses were limited to 16 countries after excluding Russia, Poland, Hungary, Slovak and Czech Republics and Israel. We limited the sample because the period under study witnessed the break-up of the Soviet Union, collapse of other eastern block governments, and the continuing struggles in Israel. Such social instability may directly affect both income inequality and measures of the psycho-social environment thus making comparisons with countries having more stable political, economic and social institutions difficult to interpret.

There is clearly much to be learned from studying population health in the transition economies of eastern Europe. It is not that the population health experiences in these ex-Soviet countries are not informative – it is that they may not be directly comparable to countries with relatively stable economies, governments and social institutions. We were interested in understanding how income inequality and the psycho-social environment affected population health in a subset of countries variously characterized in the literature as being wealthy, democratic, market-based economies. If the goal was to generalize to transition economies or countries undergoing civil strife, economic, political or institutional turmoil then inclusion of other countries may be appropriate. In this case, these countries were excluded because they are

not in the target population to which both theoretical and policy-relevant generalizations have been and continue to be made. There is no doubt that understanding the population health effects of civil strife or transition from one kind of political economy to another is of great importance, but it is another question what implications that might have for the population health effects of income inequality and the psycho-social environment as it currently exists in stable, western democracies.

Assessment of Income Inequality

We used the Gini coefficient, based on equivalized household disposable income, as our measure of income inequality. This is a standard measure providing an overall estimate of inequality that ranges from 0 to 1 – higher values mean greater inequality. We also examined the ratios of the 90^{th} and 50^{th} income percentiles to the 10^{th} as indicators of inequality but using these did not substantively alter results.

Assessment of the Psycho-social Environment

We used data from the 1990-91 wave of the World Values Survey (WVS)[37] to generate measures of the quality of the psycho-social environment. The WVS was conducted through face-to-face interviews of nationally representative samples in 43 countries and collected data on beliefs toward political, cultural, economic, civic and other aspects of life. All measures were weighted to generate valid national estimates. “Distrust” was measured by the question “Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people.” “Belonging to Organizations” and “Volunteering” was the mean number of organizations to which respondents reported belonging and doing unpaid work. Both these question were asked in regard to a variety of organizations - social welfare, religious,

education/cultural, political, local community, third world development/human rights, conservation/environment, professional, youth, recreation, women's groups, peace, animal rights, health-related, or other groups. Mean perceptions of "Control" were calculated from a question concerning how much "freedom of choice and control you feel you have over the way your life turns out". "Belonging to a Trade Union" was the percent of respondents reporting trade union membership. We *a priori* distinguished "belonging to trade unions" from belonging to other types of organizations, because of the specific role trade unions play in affecting socioeconomic policies and in mediating social class relations. We also included an additional social indicator from the UN Human Development Report – "Females in Government" - which represents the percent of elected seats in national government held by women.[38]

Assessment of Health Outcomes

Life expectancy at birth (1991-1993) was taken from the World Health Organization's Statistical Information System (http://www.who.int/whosis/). Mortality rates were calculated from age- and sex-specific numbers of deaths and population counts from the WHO Mortality Data Base (http://www.who.int/whosis/mort/download.htm#). All-cause death rates were standardized in five-year age groups using the new European Standard populations for males and females.[39] Rates were calculated for all ages combined and age groups <1, 1-14, 15-44, 45-64, and 65 plus. Standardized mortality rates were also computed for the following causes of death: coronary heart disease (ICD-9 Basic Tabulation List code=27), stroke (29), lung cancer (101), breast cancer (113), prostate cancer (124), diabetes (181), infectious (01-07), chronic obstructive pulmonary disease (323, 324, and 325), cirrhosis (347), unintended injury (E47 through E53), suicide plus deaths undetermined whether accidental or suicide (E54 and E560), and homicide

(E55). We calculated age-specific rates of unintentional injury mortality because of the heterogeneity in the underlying causes of these deaths. Infant unintentional deaths may include suffocation or burns while unintentional deaths among older groups are dominated by motor vehicle accidents. The WHO Mortality Data Base contains ICD-9 cause of death coding for all countries except Denmark and Switzerland. Cause-specific rates for these countries were calculated from the corresponding ICD-8 "A" list codes. Mortality rates were computed for 1989-92 for all countries except Germany, where only 1990-92 data were available. Rates of low birth weight (< 2,500gm) were obtained from WHOSIS and were available for 1991-93 for all study countries except Canada and the U.S., for which 1989-90 rates were used. Low birth weight data were not available for the Netherlands. Self-rated poor health was taken from the WVS, and represents the percent of the population reporting their health to be “fair, poor, or very poor”. All outcomes were calculated from pooled rates for the years described above, except for self-rated health which was based on point prevalence for 1990-91 round of the WVS survey.

Statistical Analyses

Pearson correlation coefficients were calculated for associations between income inequality, social capital and health outcomes. All analyses were weighted by population size and adjusted for gross domestic product (GDP/capita), using the Penn World Tables purchasing power parity. (http://www.datacentre.chass.utoronto.ca/pwt/).

Results

We first examined data on income inequality and life expectancy for 22 countries in the Wave III LIS database. As we have argued elsewhere, when data points are few, the selection of countries

can be crucial to interpretation of results.[40] Thus, we have presented data from all available countries in Figure 1, which shows that income inequality was strongly and negatively associated with life expectancy (r=-0.75, p=0.0001). Inspecting the plot revealed that this association was largely induced by the data point for Russia, where the level of income inequality vastly exceeded even the US. For the reasons explained above, we excluded Israel, Russia, Poland, Hungary, Czech and Slovak Republics. Thus, all subsequent analyses were limited to the remaining 16 countries.

Income Inequality and Age-specific Mortality

Table 1 shows sex-specific associations of income inequality with mortality by age and cause, and with life expectancy for 16 countries. Low birth weight and poor self-rated health were only available for both sexes combined. Table 1 shows that higher income inequality was strongly associated with greater mortality among infants (r=0.69, p=0.004 for females; r=0.74, p=0.002 for males), and more moderately associated with mortality among those aged 1-14 in both sexes. Associations between income inequality and mortality declined with age at death, and then reversed, so that among those aged 65 or older, higher income inequality was moderately, but not significantly, associated with lower all-cause mortality. In analyses not shown, exclusion of the US substantially diminished the associations between income inequality and child mortality. For instance, the correlation between inequality and female infant mortality dropped from r=0.69 to r=0.26 (p=0.37).

Income Inequality and Cause-specific Mortality

Income inequality exhibited inconsistent associations with specific causes of death. Among women, higher inequality was at least moderately associated with higher rates of homicide, lung cancer, COPD, infectious disease, and unintentional deaths under age 1. However, it was also moderately but not significantly associated with lower stroke and suicide rates among women. For men, higher inequality was associated with higher rates of homicide, infectious and unintentional death from ages 0-14, but it was also associated with lower stroke mortality. Income inequality was not associated with CHD, breast or prostate cancer, cirrhosis or diabetes. Exclusion of the US removed associations between income inequality and deaths from unintentional injury, infectious disease and homicide (data not shown). For instance, the correlation between inequality and female homicide mortality dropped from r=0.66 and actually reversed sign to r=-0.14 (p=0.63).

Income Inequality, Life Expectancy, Low Birth Weight, and Poor Self-rated Health

Higher income inequality was strongly associated with a greater proportion of low birth weight infants (r=0.79, p=0.001). This association was reduced to r=0.53 (p=0.06) with exclusion of the US. Income inequality was not related to life expectancy differences across these 16 countries and was only moderately associated with poorer self-rated health.

Psycho-social Environment, Trade Union Membership, Female Political Representation and Age-specific All-Cause Mortality

Table 2 shows that belonging to organizations, distrust and control were unrelated to mortality at any age. However, countries that had greater trade union membership and political representation

by women had better child mortality profiles. For instance, lower male infant mortality was associated with greater trade union membership (r=-0.58, p=0.04) and female political representation (r=-0.73, p=0.002). Similar but weaker patterns emerged for mortality between ages 1-14. No social indicators were strongly related to mortality at higher ages, except volunteering which was related to lower mortality among the elderly.

Psycho-social Environment, Trade Union Membership, Female Political Representation and Cause-specific Mortality

Measures of the quality of the psycho-social environment showed generally weak and somewhat inconsistent associations with cause-specific mortality. Greater distrust was associated with lower CHD mortality among both females (r=-0.61, p=0.03) and males (r=-0.63, p=0.02). As distrust and control were strongly negatively correlated (r=-0.62, p=0.02), higher levels of perceived control were also significantly correlated with higher CHD mortality in both men and women. Distrust was also moderately associated with greater cirrhosis and unintentional deaths under 1 and above 65. Belonging to organizations was associated with lower cirrhosis among men and women. The amount of volunteering was negatively associated with stroke and cirrhosis. Associations with measures of social capital were unchanged by excluding the US. Greater trade union membership and having more females in government were both moderately associated with lower unintentional death, especially among the young.

Psycho-social Environment, Trade Union Membership, Female Political Representation Life Expectancy, Low Birth Weight, and Poor Self-rated Health

None of the psycho-social indicators were associated with female or male life expectancy. Only trade union membership and females in government were associated with reduced rates of low birth weight. Poor self-rated health was only associated with volunteering (r=-0.80, p=0.003).

Discussion

What should we conclude from these analyses? First, we should recognize the inherent limitations of interpreting associations based on sixteen, or fewer observations. To illustrate this point, in Panel (a) of Figure 2 we have selected the 9 countries that were used in the important 1992 analysis that sparked so much interest in this topic.[6] That study reported a correlation of r=0.86 between more equal income distribution and life expectancy using data for the late 1970s and early 1980s. Panel (a) shows that when we used these same 9 countries, but analyzed data for 1989-92, higher income inequality was associated with lower life expectancy albeit more weakly (r=-0.45). However, now that data have become available for Italy, Spain, France, Belgium, Finland, Luxembourg and Denmark, Panel (b) of Figure 2 shows that when these countries were added to the analysis, there was no longer an association between income inequality and life expectancy (r=-0.09, p=0.75). Thus, the discrepancy between our results and the previous study,[6] is simply that we had the advantage of being able to include more countries as data became available.

Adding these particular countries highlights the complexity of attempting to come up with universal theories for what explains variations in population health among rich nations. While

not directly comparable to the current analyses because they were based on within-country differences, Mackenbach[31] and Kunst,[32] clearly show how deciphering variation in the extent of within-country socioeconomic health inequalities across Europe is complicated by between-country differences in the cause-of-death structure, particularly the north-south differences in CHD.[33] Three of the countries we added in Panel (b) - Spain, Italy and France are typical of the pattern in southern Europe - higher life expectancy due largely to lower CHD. The countries added from northern Europe - like Denmark and Finland - have lower inequality, but higher CHD rates and lower life expectancy. Assuming that these north-south CHD and life expectancy differences did not emerge between the 1970s and 1990s, and if the data had been available, it seems likely that earlier studies[6] would also have found little association between income inequality and life expectancy for this expanded set of countries.

Income Inequality and Health

Cognizant of the dangers of over-interpretation, what can we reasonably conclude from these patterns of findings? It appears there is a relatively strong and consistent pattern of associations between income inequality and child health outcomes. Higher income inequality was associated with higher infant mortality, low birth weight and mortality aged 1-14 in both sexes. For a country of such vast wealth, the United States has appalling levels of both income inequality and child health. Associations with infant and early-life mortality largely disappeared when the US was excluded from analyses (data not shown), but an association with low birth weight remained ($r=0.53$, $p=0.06$) due to high levels of both income inequality and low birth weight in the UK. Associations with mortality above age 65 were the opposite of that predicted by the theory that higher income inequality is automatically bad for health. These negative associations were

largely driven by the fact that higher inequality countries like the US and France have relatively low mortality above age 65, especially for CHD, compared to countries like Finland, Denmark, Luxembourg and Germany. The age-specific pattern of associations between income inequality and mortality may be consistent with time lags. It is widely recognized that income inequality within many of these countries generally narrowed after WWII, but increased markedly since the 1970's and so it is possible that the associations observed with child health outcomes may be reflected in differences in adult health at some future point in time, as populations exposed to this period of increasing inequality age. Longer-term data on changes in inequality and health are needed to explore this hypothesis.

Some of the strongest arguments in support of the theory that greater income inequality produces worse population health have come from analyses of homicide. In some ways, homicide has been the quintessential example of a cause-of-death that is plausibly affected by the extent of income inequality,[41] the breakdown of social cohesion and the negative emotions of distrust and hostility, it is theorized to engender in individuals.[1] While income inequality was reasonably strongly correlated with homicide, these associations were almost entirely induced by the US data point. For instance, excluding the US changed the correlation between income inequality and homicide from $r=0.65$ ($p=0.01$) to $r=-0.15$.

According to the psycho-social environment theory, income inequality is associated with health through two main pathways – behaviour and stress.[42] Income inequality was associated with lung cancer, but only among women. On the other hand, it was not associated with cirrhosis – an outcome with a clearly identifiable behavioural component. Nor was income inequality

associated with CHD or diabetes – outcomes linked to both behaviour and psycho-neuro-endocrine stress mediation.

Quality of the Psycho-social Environment and Health

The most important piece of empirical evidence in support of the idea that social capital is an important determinant of population health came from a study of 38 US states.[10] That cross-sectional study showed that levels of distrust and the extent of organizational membership mediated the within-country association between income inequality and mortality. While we used almost identical indicators of social capital to those used in the US study, we failed to find any consistent associations with between-country differences in age- or cause-specific mortality. In fact, one of the stronger correlations observed in these data was the association between higher distrust and lower CHD among both men ($r=-0.63$, $p=0.02$) and women ($r=-0.61$, $p=0.03$). This finding is the exact opposite of what the current income inequality-psychosocial environment theory would predict and is inconsistent with findings of a small within-country study of 10 US cities.[43] An examination of the data plots revealed that people in France, Italy and Spain (lower CHD countries) reported the highest levels of distrust, while those in Finland, Sweden and Norway (higher CHD countries) reported the lowest distrust. One could speculate over the reasons for these international differences in the tendency to report distrust, but they are likely the product of quite particular historical, social and cultural forces. It is also possible that the general practice of aggregating individual responses to characterize the psycho-social environment of a place may be inappropriate for between-country comparisons because of their cultural specificity. Additionally, the individual-level correlates of distrust may vary across countries.

These results do not offer much support for a psycho-social environment theory as a general explanation for health differences between rich countries. Higher perceived control over life circumstances was actually significantly associated with higher CHD – the opposite of what would be predicted by the psycho-social environment theory and the opposite of what would be inferred from individual-level studies. Social capital indicators were associated with cirrhosis, but not lung cancer, diabetes or homicide as might be specifically predicted by the theory. Belonging to organizations was not strongly associated with any health outcomes, except cirrhosis, while volunteering was also associated with lower stroke mortality and better self-rated health. In contrast, belonging to one specific type of organization - trade unions - appeared more strongly and broadly associated with better health, especially for children. It is noteworthy that some of the strongest associations observed in these data were between greater female political participation and better child health.

Conclusions

It seems difficult to sustain the theory that income inequality and indicators of the quality of the psycho-social environment explain between-country health differences among these stable, wealthy nations. What theoretically consistent associations do exist are largely limited to child health outcomes and cirrhosis. Does this mean we think economic inequality is not an important determinant of health? No – clearly there is abundant evidence that within countries, lower income is a powerful determinant of poorer health. In addition, the extent of unequal income distribution has been associated with health within some countries.[8-10,25,44] Does it mean we think that psycho-social factors are not important in understanding health? No – there is certainly

evidence that within populations, psycho-social factors are associated with poorer health. Our results show that neither an income inequality nor psycho-social environment theory of health is universally applicable to understanding why some countries have better population health than others.[45,46]

Our findings appear consistent with a previous study that compared the US and Canada.[47] While the extent of inequality was strongly related to health differences between US metropolitan areas, there was no association between income inequality and mortality across such areas in Canada. Evidence comparing states and cities within the US has been used extensively to support the income inequality-psychosocial environment theory of population health. It seems likely that the US is the exception, not the rule, and it is possible that evidence drawn from studies within the US has less direct applicability to other wealthy nations. Higher income inequality within the US is overwhelmingly associated with more unequal distribution of many powerful determinants of health. This may not be the case in other wealthy countries where there has been more widespread and more evenly distributed social investments in public health relevant goods and services. As we have argued elsewhere,[3] there is no necessary association between income inequality and population health – it may depend on the distribution of other health-relevant resources and exposures that exist within a country. For example, low CHD in southern Europe may be related to high prevalence and low social inequality in healthy diets, while the relatively low life expectancy of Danish women is likely related to the high prevalence and low social inequality in smoking.[48] Understanding how different countries generate particular patterns and trends in population health is likely to be historically and culturally contextualized.[45,49]

It may not be income inequality *per se*, or the quality of the psycho-social environment that drive population health. Rather, what may be most important is the current and historical links between income inequality and the distribution of health-relevant resources and exposures, and how these links have played out over the lifecourse of different birth cohorts.[50] Levels of health within a country are the product of complex interactions of history, culture, politics, economics, and the status of women and minorities. These complex interactions may not be adequately described by current levels of income inequality or aggregate indicators of the psycho-social environment.

Contributers

John Lynch and George Davey Smith contributed to the idea, design, analysis and interpretation of the data. Marianne Hillemeier, Mary Shaw, and Trivellore Raghunathan contributed to the design, analysis and interpretation of the data. All authors contributed to the writing of the manuscript.

This research was partly supported by the University of Michigan Center for Social Epidemiology and Population Health, University of Michigan Initiative on Inequalities in Health and University of Michigan Inter-disciplinary Center on Social Inequalities in Mind and Body.

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Table 1. Correlations (p-value) weighted by population size between mortality, life expectancy, low birth weight, self-rated health and income inequality (gini coefficient) among 16 OECD countries (1989-92), adjusted for GDP/capita.

		Females	**Males**
Mortality by Age	Infant Mortality	0.69 (0.004)	0.74 (0.002)
	Mortality 1-14	0.53 (0.04)	0.60 (0.02)
	Mortality 15-44	0.46 (0.09)	0.45 (0.09)
	Mortality 45-64	0.35 (0.20)	0.09 (0.75)
	Mortality > 65	-0.41 (0.12)	-0.47 (0.08)
	All ages	-0.28 (0.32)	-0.26 (0.34)
Mortality by Cause	Coronary Heart Disease	0.03 (0.93)	-0.04 (0.88)
	Stroke	-0.46 (0.09)	-0.56 (0.03)
	Lung Cancer	0.65 (0.01)	0.21 (0.44)
	Breast Cancer	0.04 (0.89)	-
	Prostate Cancer	-	-0.16 (0.57)
	Diabetes	-0.21 (0.45)	-0.05 (0.85)
	Infectious	0.50 (0.06)	0.47 (0.08)
	COPD	0.63 (0.01)	0.12 (0.68)
	Cirrhosis	-0.31 (0.26)	-0.32 (0.25)
	Unintentional < 1	0.48 (0.07)	0.46 (0.08)
	Unintentional 1-14	0.35 (0.20)	0.49 (0.06)
	Unintentional 15-44	0.44 (0.10)	0.34 (0.22)
	Unintentional 45-64	0.23 (0.41)	0.07 (0.79)
	Unintentional > 65	-0.35 (0.20)	-0.20 (0.47)
	Suicide	-0.49 (0.07)	-0.28 (0.31)
	Homicide	0.66 (0.01)	0.65 (0.01)
Life Expectancy		0.04 (0.89)	-0.11 (0.70)
Low Birth Weight		0.79 (0.001)	
Self-Rated Poor Health		-0.46 (0.12)	

Table 2. Correlations (p-value) between mortality, life expectancy, low birth weight, self-rated health, and distrust, organizational membership, volunteering, control, trade union membership and the percent of females elected to national government among OECD countries (1989-92), adjusted for GDP/capita and weighted by population size. (All available data has been used but sample sizes differ because some questions in the WVS were not asked in some countries)

Females		**Distrust n=14**	**Belonging to Organizations n=13**	**Volunteering n=12**	**Control n=14**	**Belonging to Trade Union n=14**	**% Females in Government n=16**
Mortality by Age	Infant Mortality	0.07 (0.82)	-0.21 (0.51)	0.25 (0.47)	0.14 (0.64)	-0.56 (0.04)	-0.63 (0.01)
	Mortality 1-14	0.12 (0.70)	0.13 (0.70)	0.23 (0.49)	0.32 (0.29)	-0.52 (0.07)	-0.41 (0.13)
	Mortality 15-44	0.36 (0.22)	-0.10 (0.76)	0.05 (0.89)	0.10 (0.75)	-0.38 (0.20)	-0.37 (0.18)
	Mortality 45-64	-0.33 (0.28)	0.24 (0.45)	-0.31 (0.36)	0.40 (0.18)	0.15 (0.62)	-0.19 (0.50)
	Mortality > 65	-0.33 (0.28)	0.19 (0.56)	-0.59 (0.06)	0.28 (0.35)	0.40 (0.17)	0.43 (0.11)
	All ages	-0.33 (0.27)	0.20 (0.53)	-0.59 (0.06)	0.33 (0.27)	0.36 (0.23)	0.33 (0.24)
Mortality by Cause	CHD	-0.61 (0.03)	0.30 (0.35)	-0.14 (0.67)	0.63 (0.02)	0.46 (0.1)1)	0.16 (0.56)
	Stroke	-0.29 (0.33)	0.02 (0.95)	-0.55 (0.08)	0.23 (0.45)	0.31 (0.29)	0.44 (0.10)
	Lung Cancer	-0.44 (0.13)	0.17 (0.59)	0.53 (0.10)	0.54 (0.06)	-0.06 (0.84)	-0.46 (0.08)
	Breast Cancer	-0.21 (0.49)	0.37 (0.23)	-0.22 (0.51)	-0.10 (0.75)	0.20 (0.50)	-0.12 (0.68)
	Diabetes	-0.08 (0.78)	-0.04 (0.91)	-0.13 (0.69)	-0.02 (0.95)	-0.26 (0.39)	0.19 (0.51)
	Infectious	0.26 (0.39)	0.01 (0.96)	0.33 (0.32)	0.11 (0.71)	-0.39 (0.19)	-0.38 (0.16)
	COPD	-0.32 (0.29)	0.18 (0.57)	0.13 (0.70)	0.42 (0.15)	-0.16 (0.61)	-0.51 (0.05)
	Cirrhosis	0.50 (0.08)	-0.58 (0.05)	-0.66 (0.03)	-0.37 (0.22)	-0.28 (0.35)	0.16 (0.57)
	Unintentional < 1	0.63 (0.02)	-0.33 (0.29)	0.10 (0.76)	-0.15 (0.64)	-0.59 (0.03)	-0.46 (0.08)
	Unintentional 1-14	0.21 (0.49)	0.02 (0.94)	0.30 (0.38)	0.23 (0.44)	-0.40 (0.18)	-0.30 (0.27)
	Unintentional 15-44	0.34 (0.25)	-0.28 (0.37)	0.37 (0.27)	0.18 (0.55)	-0.54 (0.06)	-0.42 (0.12)
	Unintentional 45-64	0.42 (0.16)	-0.31 (0.34)	0.42 (0.20)	-0.09 (0.77)	-0.28 (0.35)	-0.24 (0.38)
	Unintentional > 65	0.53 (0.06)	-0.33 (0.29)	-0.25 (0.46)	-0.78 (0.002)	0.07 (0.82)	0.18 (0.52)
	Suicide	0.34 (0.26)	-0.04 (0.89)	-0.38 (0.25)	-0.45 (0.12)	0.45 (0.13)	0.39 (0.15)
	Homicide	-0.03 (0.93)	-0.01 (0.98)	0.40 (0.22)	0.37 (0.22)	-0.42 (0.16)	-0.45 (0.09)
Life Expectancy		0.45 (0.12)	-0.33 (0.29)	0.41 (0.20)	-0.44 (0.13)	-0.31 (0.30)	-0.14 (0.62)
Low Birth Weight (both sexes combined)		0.07 (0.84)	0.13 (0.70)	0.22 (0.55)	0.22 (0.49)	-0.57 (0.05)	-0.71 (0.005)
Self-Rated Poor Health (both sexes combined)		0.47 (0.11)	-0.36 (0.25)	-0.80 (0.003)	-0.29 (0.33)	-0.17 (0.58)	0.29 (0.34)

Table 2. continued

Males		**Distrust n=14**	**Belonging to Organizations N=13**	**Volunteering n=12**	**Control n=14**	**Belonging to Trade Union n=14**	**% Females in Government n=16**
Mortality by Age	Infant Mortality	0.20 (0.51)	-0.23 (0.47)	0.19 (0.58)	-0.02 (0.95)	-0.58 (0.04)	-0.73 (0.002)
	Mortality 1-14	0.13 (0.67)	0.01 (0.98)	0.23 (0.50)	0.32 (0.28)	-0.57 (0.04)	-0.48 (0.07)
	Mortality 15-44	0.39 (0.18)	-0.31 (0.33)	0.23 (0.50)	0.13 (0.67)	-0.52 (0.07)	-0.34 (0.21)
	Mortality 45-64	0.41 (0.16)	-0.21 (0.51)	-0.39 (0.24)	-0.04 (0.88)	-0.15 (0.63)	-0.05 (0.87)
	Mortality > 65	-0.32 (0.28)	0.34 (0.29)	-0.51 (0.11)	0.11 (0.73)	0.48 (0.10)	0.43 (0.11)
	All ages	-0.06 (0.84)	0.17 (0.59)	-0.53 (0.09)	0.13 (0.67)	0.25 (0.42)	0.27 (0.33)
Mortality by Cause	CHD	-0.63 (0.02)	0.36 (0.25)	-0.11 (0.74)	0.55 (0.05)	0.53 (0.06)	0.23 (0.42)
	Stroke	-0.15 (0.62)	-0.08 (0.81)	-0.60 (0.05)	0.04 (0.90)	0.31 (0.30)	0.50 (0.06)
	Lung Cancer	-0.07 (0.83)	0.33 (0.30)	0.27 (0.43)	-0.19 (0.52)	-0.34 (0.26)	-0.39 (0.15)
	Prostate Cancer	-0.16 (0.60)	0.48 (0.12)	0.07 (0.84)	-0.003 (0.99)	0.52 (0.07)	0.22 (0.43)
	Diabetes	-0.23 (0.44)	-0.01 (0.97)	-0.02 (0.95)	0.12 (0.70)	-0.25 (0.41)	0.09 (0.74)
	Infectious	0.30 (0.32)	-0.06 (0.85)	0.24 (0.48)	0.13 (0.68)	-0.42 (0.16)	-0.33 (0.23)
	COPD	-0.40 (0.18)	0.41 (0.18)	-0.11 (0.75)	0.34 (0.25)	-0.02 (0.94)	-0.16 (0.58)
	Cirrhosis	0.56 (0.05)	-0.58 (0.05)	-0.71 (0.01)	-0.31 (0.31)	-0.30 (0.31)	0.19 (0.49)
	Unintentional < 1	0.67 (0.01)	-0.33 (0.30)	0.13 (0.70)	-0.22 (0.48)	-0.64 (0.02)	-0.47 (0.08)
	Unintentional 1-14	0.12 (0.71)	-0.04 (0.90)	0.32 (0.33)	0.38 (0.20)	-0.52 (0.07)	-0.40 (0.14)
	Unintentional 15-44	0.33 (0.26)	-0.36 (0.26)	0.33 (0.31)	0.21 (0.49)	-0.55 (0.05)	-0.30 (0.27)
	Unintentional 45-64	0.28 (0.35)	-0.33 (0.29)	0.46 (0.16)	0.06 (0.84)	-0.22 (0.47)	-0.002 (0.99)
	Unintentional > 65	0.47 (0.10)	-0.32 (0.31)	0.11 (0.74)	-0.60 (0.03)	-0.02 (0.95)	0.11 (0.70)
	Suicide	0.35 (0.25)	-0.13 (0.68)	-0.08 (0.81)	-0.25 (0.40)	0.29 (0.33)	0.23 (0.41)
	Homicide	-0.04 (0.89)	-0.07 (0.84)	0.40 (0.23)	0.28 (0.36)	-0.46 (0.11)	-0.45 (0.09)
Life Expectancy		-0.14 (0.65)	-0.07 (0.82)	0.28 (0.40)	-0.21 (0.49)	0.13 (0.68)	0.06 (0.82)

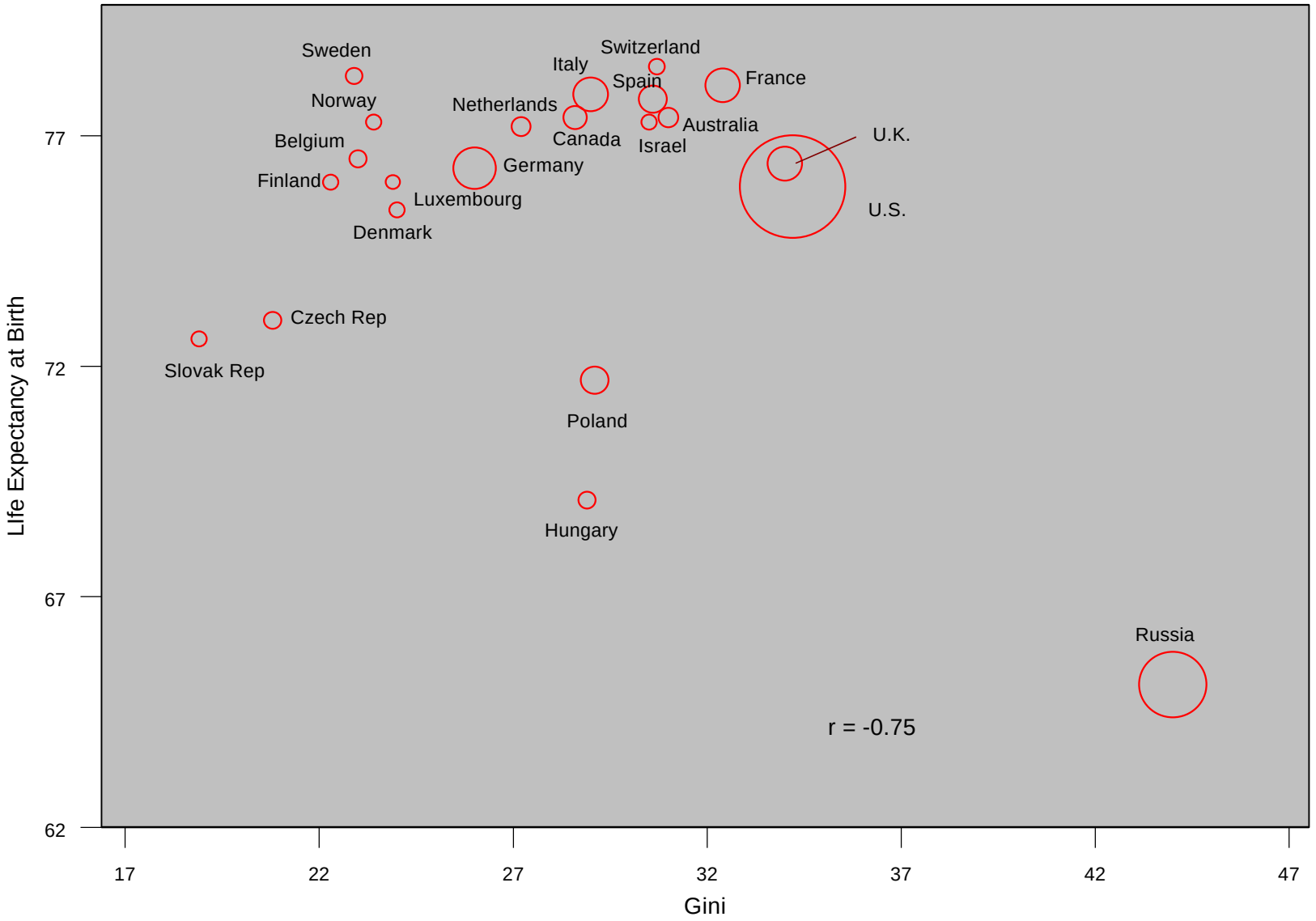
Figure Legends

Figure 1. Income inequality (gini coefficient) and life expectancy for all 22 countries reporting to the Luxembourg Income Study, for the period 1989-1991. *Circles represent country population size.

Figure 2.

Panel A – Income inequality (gini coefficient) and life expectancy for the same 9 countries reported by Wilkinson (1992),[11] but with information updated to 1989-1991.

Panel B – Income inequality and life expectancy after adding the other 7 countries for which income inequality data is now available in the Luxembourg Income Study, for the period 1989-1991. *Circles represent country population size


Sweden
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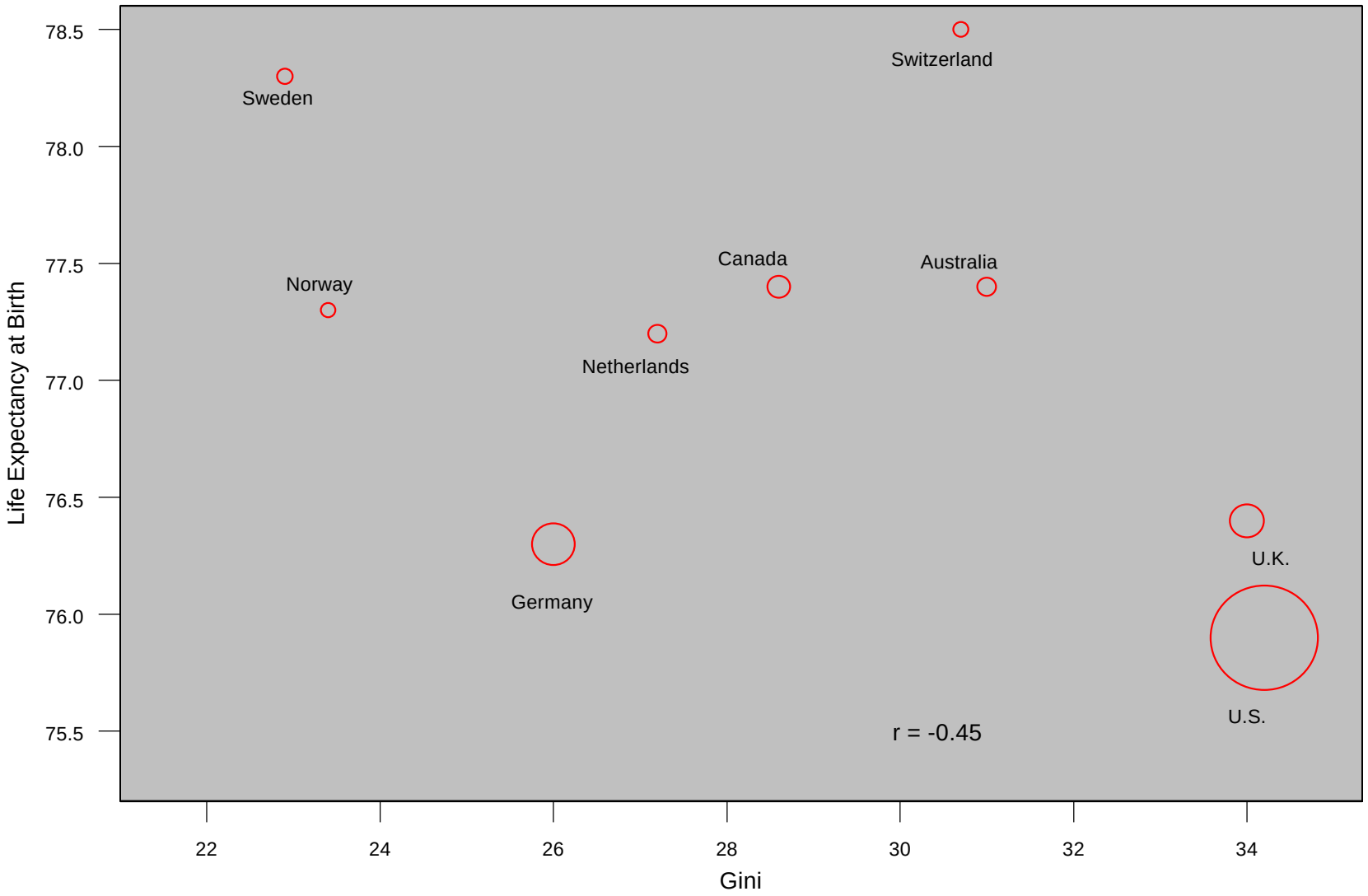
LIfe Expectancy at Birth
Gini


Life Expectancy at Birth
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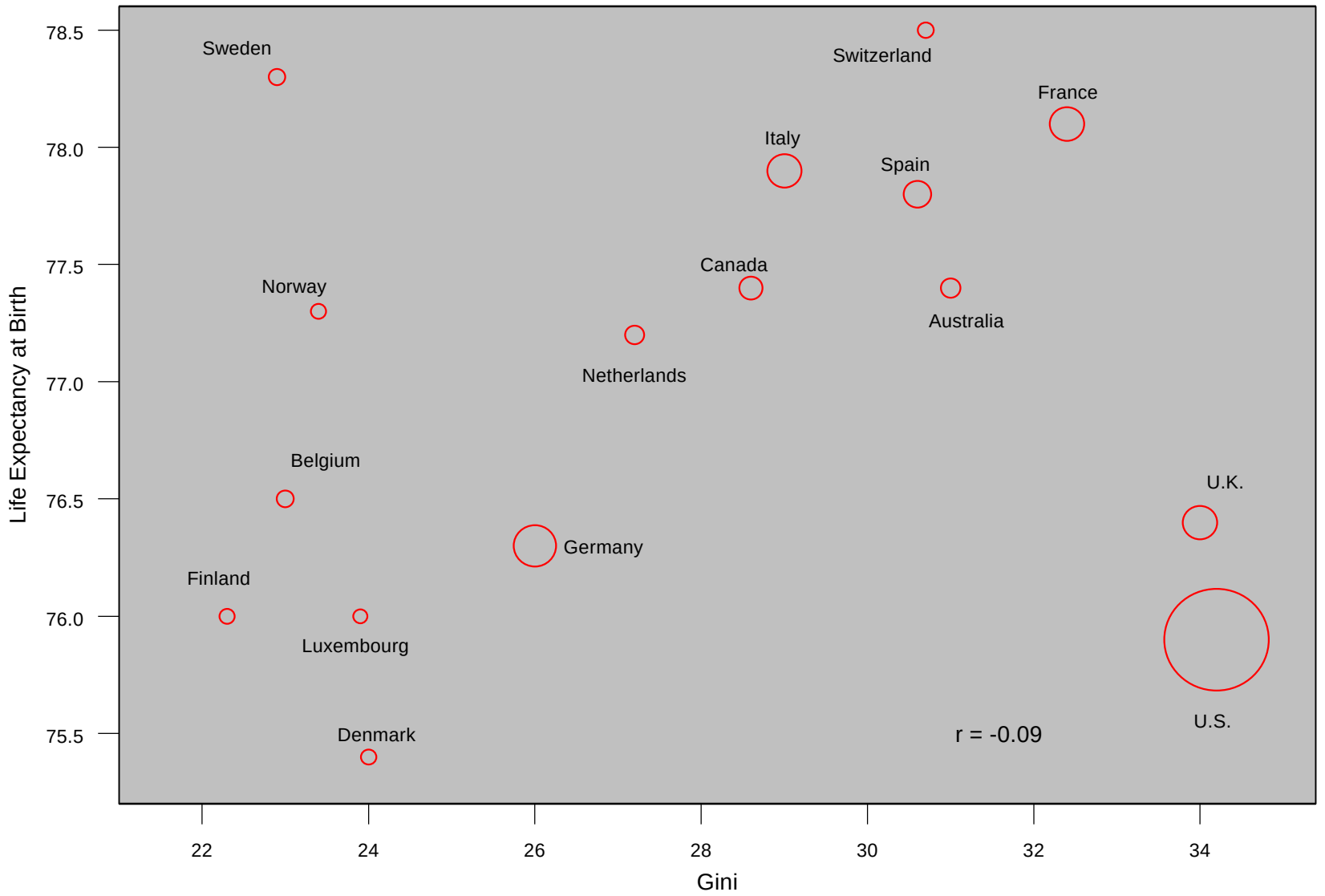
Gini


Life Expectancy at Birth
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Australia
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Germany
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Denmark
r = -0.09
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