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Can market structure explain cross-country differences in health?

ORIGINAL RESEARCH

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ABSTRACT

There is a well documented health disparity between several European countries and the United States. This health gap remains even after controlling for socioeconomic status and risk factors. At the same time, we note that the U.S. market structure is characterized by significantly more large corporations and "super-sized" retail outlets than Europe. Because big business is hierarchical in nature and has been reported to engender urban sprawl, inferior work environments, and loss of social capital, all identified as correlates of poor health, we suggest that differences in market structure may help account for some of the unexplained differences in health across Europe and North America. Using national level data, this study explores the relationship between market structure and health. We investigate whether individuals who live in countries with proportionately more small business are healthier than those who do not. We use two measures of national health: life expectancy at birth, and age-standardized estimates of diabetes rates. Results from ordinary least squares regressions suggest that, there is a large and statistically significant association between market structure (the ratio of small to total businesses) and health, even after controlling income, public percent of health expenditure, and obesity rates. This association is robust to additional controls such as insufficient physical activity, smoking, alcohol disease, and air pollution.

Keywords

Europe; United States; Health; Market structure; Small business

CROSS-COUNTRY DIFFERENCES IN HEALTH

Recent evidence suggests that individual health is better in the United Kingdom than the United States despite lower spending on health care in the former [1]. Moreover, Banks et al. [1] report that substantial health disparities persist, even after controlling for socioeconomic status and risk factors. Indeed, the UK is not the only nation to have better health than the United States. Avendando et al. [2] find that among those aged 50 to 74, Americans report worse health (i.e. cancer, diabetes, stroke) than Europeans, and that health behaviours account for only a small portion of the cross-country gap. A health differential is apparent not only for those aged 50 to 74, but also for the general population. Across measures such as life expectancy, heart disease, and diabetes, Americans fare worse than the majority of their European counterparts [3]. For example, in 2009, life expectancy at birth was 82.3 in Switzerland, compared with 78.2 in the U.S. [3]. Similar disparities are reported in Or, 2000 [4], where differences remain despite controlling for socio-economic status and risk factors. Even among European nations there exists substantial variation in health [3,5,6], which as Nixon and Ulmann [7] note, is not explained by risk factors nor public health expenditures.

Coincident with the cross-country differences in health, there exists substantial variation in market structure across European countries and the United States. Specifically, over the last several decades, the United States has been characterized by a rise in large corporations and super-sized retail outlets. Unlike the U.S., European nations (Italy, France and Belgium in particular) have experienced a slower growth of hypermarkets, in part due to size-based entry regulation [8-11]. Studies by Rybczynski and Curtis [12] and Blanchard et al. [13] indicate a strong positive association between the prevalence of small business in a community and individual or community health. As such, we believe that market structure, as measured by the portion of small to total businesses in a nation, may have a role in explaining, at least in part, the observed cross-country differences in health. If a significant association exists, this research should raise concern for European countries, like Italy, where the preference for small family

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owned businesses, and accompanying size restricting legislation, is recently under scrutiny and change [10,11].

WHY SMALL BUSINESS MAY MATTER: PATHWAYS BETWEEN MARKET STRUCTURE AND HEALTH

A plethora of research exists on the determinants of health at the individual and population levels. Although causal relationships are difficult to prove [14,15], the accumulation of evidence provides strong support for age, gender, income, education, marital status, health behaviours, availability of health care to be basic determinants of health (see for example, Mikkonen and Raphael, 2010 [16] for excellent summary). Evidence from the Whitehall studies [17-19] is seminal in introducing the relationship between social hierarchy and health. Their work indicates a gradient in health status (subjective and objective; physical and psychological) among well-paid British civil servants. The Whitehall studies show that the gradient appears at even the highest employment grades and is thus not likely to be a matter of deprivation causing poor health. Evans and Stoddart [20] present a conceptual framework for the relationship between the determinants of health and population health and well-being still used by health researchers today to discuss the determinants of both population and individual health (see for example Hurley, 2010 [21]). These original studies launched an industry of research on the theme of hierarchies leading to the conclusion that hierarchies (whether in a person's employment, social or income status) are positively related to health (the higher on the ladder the better ones health – the gradient) but also that hierarchies or inequalities lead to lower levels of population health, on average.

Research investigating the repercussions of modern, supersized, market structure has highlighted several factors of big business which are associated with health outcomes, both positively and negatively. For example, larger firm size brings economies of scale. As such, large companies can offer better medical and dental benefits packages [13] and thus may have a positive impact on health. Major retail outlets are also associated with lower prices on health improving goods [22]. On the other hand, big business is thought to exacerbate several known correlates of poor health such as hierarchical work environments, lack of control over work, isolation, urban sprawl, and loss of social capital (see [12,13,18,23-30] for a detailed discussion of these pathways). Indeed, Banks et al. [1] propose that the social circumstances in which people live and work may be key factors in the health differences across the UK and US, although they are unable to control for more than basic SES in their study.

Rybczynski and Curtis [12] take the original health gradient literature a step beyond SES and suggest that market structure may be an important underlying explanatory factor for health via its impact on social structure. The authors note that economic structure is at the heart of not only our work environment, but also our social norms and behaviours. Take, for example, Wilkinson's hypothesis [31]: for the majority of human existence, we lived in hunter gatherer societies which are more egalitarian, with high levels of social interaction and low chronic stress, and so our bodies perform best in such environments. Deaton [32] notes that at the heart of Wilkinson's theory is an economic construct; lack of storage technology implied that sharing/reciprocity were means by which meat from today could be turned into meat for tomorrow. Thus the social structure arose from the economic structure, the means of allocating scarce resources.

Economic structure has changed dramatically over time, typically resulting in greater productivity and improved health [32]. But not all aspects of economic development are beneficial. For obvious reasons, as GDP was rising during the industrial revolution, health was declining [32]. Although the current super-sized market structure has economies of scale which allow for health improvements, this structure also has characteristics which are associated with poor health. As such, we propose that the pattern of big business exhibited in the U.S., Canada, and some European countries may be an underlying determinant of the cross-country differences in health. To this end, we investigate the relationship between market structure and health outcomes at the national level.

Data

All data are aggregate (national level) and are obtained from one of five sources: the World Bank, the World Health Organization, national Business Registry data for Canada, the national Statistics of U.S. Businesses for the United States, and Eurostat (for members of the European Union (EU) and European Free Trade Association (EFTA)). As is common in cross-country comparisons, we are limited by the available data. Specifically, we are limited by the number of countries that we can include in our sample, because of the paucity of health and business indicators that are measu-

red consistently across nations. Our choice of indicators, described in the following section, are measured in a consistent manner, and are in-line with what is found in previous studies.

Dependent variables

The first health outcome variable that we consider is an estimate of diabetes rates. Specifically, we use an age standardized estimate of the percent of the nation's population which has a fasting glucose level at or above 126 mg/dl (7.0 mmol/l) or is on medication for raised blood glucose. These data are available for the year 2008 at the World Health Organization (WHO) data repository[1]. The second outcome variable we employ is life expectancy at birth, which was retrieved from the World Bank databank. Life expectancy at birth is an estimate of «the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life» [34]. The benefit of the former measure, raised blood glucose, is that it provides a specific, well defined, measure of poor health which can be compared across countries. Also, using this variable generates consistency with Banks et al [1], for whom diabetes rates are a key measure. The drawback of using raised blood glucose is that it represents only one aspect of poor health. Thus, we incorporate a more general measure, life expectancy at birth, in order to capture a broader range of health outcomes. Both measures are based on specific biological markers, or estimates thereof, as opposed to self-reported measures, since self-reported health diagnoses may introduce a cultural bias to health differences [1,35].

Business count data

Our key independent variable is a measure of market structure. We define market structure as the ratio of the number of small to total businesses within a nation, where small is defined as 1-9 employees. This variable is constructed from three distinct data sources. For the European countries, we obtain enterprise counts (by size) at Eurostat. For the U.S. we access the number of firms (by size) from the Statistics of U.S. Businesses, and for Canada we retrieve establishment counts (by size) from the Business Registry. Eurostat has made substantial efforts to ensure that the measures are consistent across countries; however, there are notable differences between the definitions and unit of measurement reported in the U.S. and Canada.

Statistics Canada [36] categorizes business registry data according to four distinct levels: enterprise, company, establishment and location. The enterprise level is the legal unit or highest parent company linked by common ownership. However, public use Canadian business registry data is available only at the establishment and location levels. Establishment level refers to a profit centre, or production entity, which produces a homogeneous set of goods or services, does not cross provincial boundaries and which provides data on the value of input and output. An establishment may consist of one or more locations. The location level is lowest single entity, within the business structure, that provides revenue and/or employment data from production at a single geographical location. Two locations may be considered one establishment if information on revenue and input costs is only available at the aggregate level [37].

The definitions of the levels of business are markedly different in the United States. The Statistics of U.S. Businesses [38] defines an establishment as «a single physical location where business is conducted». Business counts are reported at the firm level as well as the establishment level, where firm is defined as «a business organization consisting of one or more domestic establishments in the same state and industry that were specified under common ownership or control» [38]. In the U.S., the definition of "enterprise" differs from "firm" only in that there is no restriction on the industry or state boundaries for an enterprise. However, data is unavailable at the enterprise level.

In contrast to the Canadian and U.S. data, Eurostat collects and reports business patterns data at the enterprise level. The Eurostat business patterns data is drawn from individual nations' business registers, harmonized to report at the enterprise level[2], across most countries in the European Union and European Free Trade Association. An enterprise is defined, as «the smallest combination of legal units that is an organisational unit producing goods or services, which benefits from a certain degree of autonomy in decision-making»

[1] As with all age-standardizations, the data represents an estimate. Standardization is carried out by «applying the age-specific rates by sex in each population to one standard population. The WHO Standard Population, a fictitious population whose age distribution was artificially created and is largely reflective of the population age structure of low- and middle-income countries, was used. The resulting age-standardized rate, also expressed as a percentage of the total population, refers to the number of smokers per 100 WHO Standard Population» [33]. Estimation, using country characteristics, is also employed when specific glucose data is unavailable.

[2] Many countries report at the legal units level. In most cases, this is the same as the enterprise level [39]. As of 2002, most countries have co-operated with the harmonized collection of business data. For further information on harmonization, and compliance with OECD guidelines, please see [40-42]

[39], and may be a sole legal unit, consisting of one or more locations.

Similar to the North American registers, the Eurostat business patterns data is inclusive of almost all registered businesses. The target population of businesses in the European registers varies slightly across countries. For example, the Value Added Tax (VAT) threshold, for inclusion in the sample, can vary across country. Moreover, some Eurostat countries restrict their sample to only include businesses with employees. Although there remain issues with respect to categorization of multinational businesses, and variation in VAT thresholds across region, Eurostat has made a concerted effort to harmonize data collection in the last decade, and estimates that most member countries have close to 99% coverage of their business population [40,41].

Coverage in Canada is likewise comprehensive, the register includes any business that has been assigned an industry classification code and meets at least one of the following criteria: file corporate taxes, file individual taxes with positive business revenue, be registered for Goods and Services Tax (GST) with sales greater than zero, have at least one employee, or show evidence of size [36]. The target population for the U.S. is only slightly less broad. The Statistics of U.S. Businesses includes all employer firms that have filed a mid-March payroll [43]. However, data on establishments without employees is available from the Census Bureau's Non-employer statistics. Non-employer statistics cover all businesses which have no employees but are subject to federal income taxes, and have receipts of $1,000 or more [44].

All three sources of business demographics, the Statistics of U.S. Businesses, the Canadian Business Register and Eurostat, provide counts of establishments or enterprises by size in categories 1-4, 5-9 and 10 plus employees. Eurostat also has a category for enterprises with 0 employees, whereas Canada uses a category titled "indeterminate" for businesses that have no work force data available, because they have no workers, or they employ contract workers, family members or only owners.[3]

In terms of sectoral coverage, the Canadian Business Registry is the most comprehensive, including all sectors. The Statistics of U.S. Businesses (SUSB) includes most NAICS industries, but excludes most public sector and some primary sector industries. The most restrictive is the Eurostat data which excludes the public and primary sectors, and insurance activities of holding companies. Unlike Canadian and U.S. business data, Eurostat business demographics are only available for most countries in 2008 and 2009.

Thus, to keep the data as consistent as possible across the U.S., Canada, and Eurostat countries, we make several restrictions on the business data before constructing the ratio of small to total businesses. For the Canadian and U.S. Business data we use establishment and firm level counts respectively, and exclude the public and primary sectors.[4] Because the criterion of employment is nearly universal among business registries, and because there is a great deal of variation in the criterion of inclusion for non-employers between the U.S., Canada and Eurostat, we felt the most consistent sample restriction was to exclude all businesses with zero employees in Canada, the U.S., and Eurostat countries.[5] It should be expected that the ratio of small to total businesses is smaller when one restricts the sample to exclude non-employers. [6] However, we find that the difference in ratios is quite similar across countries, the UK and Canada in particular, when we look at employers only versus non-employers. We perform one further sensitivity check to determine whether using enterprise level versus location level data matters using U.S. and U.K. Business register data. Specifically we calculate the ratio of small to total businesses at the enterprise versus location level. For both the U.K. and the U.S. enterprise/firm level counts result in slightly higher ratios than location level counts. Certainly, no matter which measure we use, the ratio of small to total businesses is consistently greater in the U.K. relative to the U.S. and Canada. Note that the Canadian Business Register data is available biannually in June and December. We use the June data for 2008 and 2009 since, as of December 2009, the business registry no longer reports establishment counts.

Additional controls

Because our sample size is quite small, we choose a parsimonious set of control varia-

[3] The U.S. and Canadian data also have further disaggregation of establishment size for greater than 10 employees.

[4] We have insufficient industry disaggregation to exclude the activities of holding companies at the firm level; however, restricting the activities at the establishment level has little impact on the ratio of small to total businesses.

[5] We make this restriction by excluding the non-employer data in the U.S., the establishments in the indeterminant category in Canada, and enterprises with zero employees in the Eurostat countries. Eurostat has "employer only" data as well; however, the count ratios are identical, or nearly identical for all reporting countries.

[6] Typically, non-employer firms would be considered small business if they were retained in the sample. So small would be defined at 0 to 9 employees.

bles. In our preferred specification, we control for income, public health expenditure, and obesity rates. Income is represented by GDP per capita, adjusted for purchasing power parity, in 2005 constant international dollars. Our measure of public health expenditure is the public percent of total health expenditure. Both measures are retrieved from the World Bank databank [34]. We obtain age-standardized estimates of obesity rates from the WHO, where obesity is defined as a body mass index (BMI) of 30 kg/m^2 or higher, based on measured height and weight, and the rate is defined out of the population aged 20 plus. These covariates, income, health expenditure and obesity, are among the most common in the individual, regional and aggregate level health gradient literature (see for example [1,2,5,6,45]) ; however, many studies are also able to employ measures of health behaviour (including obesity may be a way of indirectly controlling for poor health behaviours) and regional characteristics. Thus, in a less parsimonious specification, we incorporate controls for health risk factors. Specifically, we use three age-standardized estimates of national risk factors (procured from the WHO): percent of the adult population that are insufficiently active; percent of the adult male population that have an alcohol disorder; and percent of the adult male population that currently smoke any tobacco product. Smoking includes daily or occasional smokers, alcohol disorders include diagnoses of harmful use of alcohol or alcohol dependence, the adult population is aged 15 plus, and insufficiently active is defined as «less than 5 times 30 minutes of moderate activity per week, or less than 3 times 20 minutes of vigorous activity per week, or equivalent» [33]. Unfortunately, the smoking and alcohol data are not available for 2008, so our measures are based on the closest available years.

Many of the additional regional characteristics which we would like to include (i.e. the unemployment rate, population dependency ratio, air pollution, Gini coefficient, ratio of health expenditure to GDP, predicted mean years of schooling, and percent urban) are strongly correlated with our existing regressors. This multicollinearity problem is common among cross-country studies with small samples (see, for example Nixon and Ulmann, 2006 [7]). Thus, given our sample size, incorporating these controls would result in over-specification; however, we do check the sensitivity of our results to inclusion of these covariates one by one and find that key coefficient estimates are substantively similar.

Variable	Mean	Standard deviation	Max	Min	Data source (years available)
% of population with raised glucose (fasting blood glucose ≥ 126 mg/dl, population aged 25+)	8.44	1.61	5.10	10.80	WHO (2008) [33]
Life expectancy at birth	77.93	3.25	71.81	81.39	World Bank (several) [34]
Ratio of small to total businesses	0.83	0.06	0.71	0.95	Eurostat, Canadian Business Register, Statistics of U.S. Businesses (2008, 2009) [36-42]
GDP/capita (PPP) (in 1000s)	29.82	13.08	11.78	73.35	World Bank (several) [34]
Public % of total Health Expenditure	72.43	10.86	41.51	84.29	World Bank (several) [34]
Obesity rate (age standardized) (BMI ≥30, population aged 20+)	21.89	4.07	15.60	31.80	WHO (2008) [33]
% of population, aged 15+, that are insufficiently active (age standardized)	36.78	12.43	17.20	63.30	WHO (2008) [33]
% of male population, aged 15+, that have an alcohol use disorder (harmful use of alcohol or alcohol dependence)	6.01	3.70	0.50	15.29	WHO (2004) [33]
% of male population, aged 15+ that currently smokes any tobacco product (age standardized)	36.92	8.23	23.80	50.11	WHO (2009) [33]
Year	2008 (except for alcohol disorders data, which is 2004 only and male smokers data which is 2009 only)				
Observations	25				

Table I. *Sample characteristics (Authors' calculations from listed data sources. Excluded from the tables, but included in the sensitivity analysis were the following variables: IIASA/VID Projection-Mean years of schooling-age 15+ (total), percent of total population living in urban area, unemployment rate (as a percent of the labour force), total population, population dependency ratio (total population over 65 or under 15 as a percent of working aged population), and health expenditure as percent of GDP, all obtained from the World Bank. Gini coefficients were retrieved from the OECD and are not available annually, but for subsets of years. We use the late 2000s subset. Outdoor air pollution data (mean annual concentration of fine suspended particles of less than 10 microns in diameter) was obtained from the WHO)*

SAMPLE CHARACTERISTICS, METHODOLOGY, AND RESULTS

Sample characteristics are reported in Table I, where we note a five percentage point difference in the maximum and minimum diabetes rates, and a ten year difference in the highest and lowest life expectancies.

The ratio of small to total businesses, likewise, spans a significant range, ranging from 0.71 to 0.95. The standard deviation represents 25 percent of this range. Scatter plots of the relationship between market structure and health outcomes are presented in Figures 1 and 2. Figure 1 indicates that countries with a greater portion of small business have lower rates of diabetes. The raw correlation is -0.309. In Figure 2, we note that life expectancy is greater for countries with a larger share of small relative to total businesses. For these variables, the raw correlation is 0.237. Thus, before controlling for any national characteristics, the ratio of small to total businesses appears to be positively associated with health.

However, this raw correlation may be driven by underlying differences among income or health systems in the individual countries. As such, we use ordinary least squares (OLS) regression analysis to determine whether the association (between market structure and

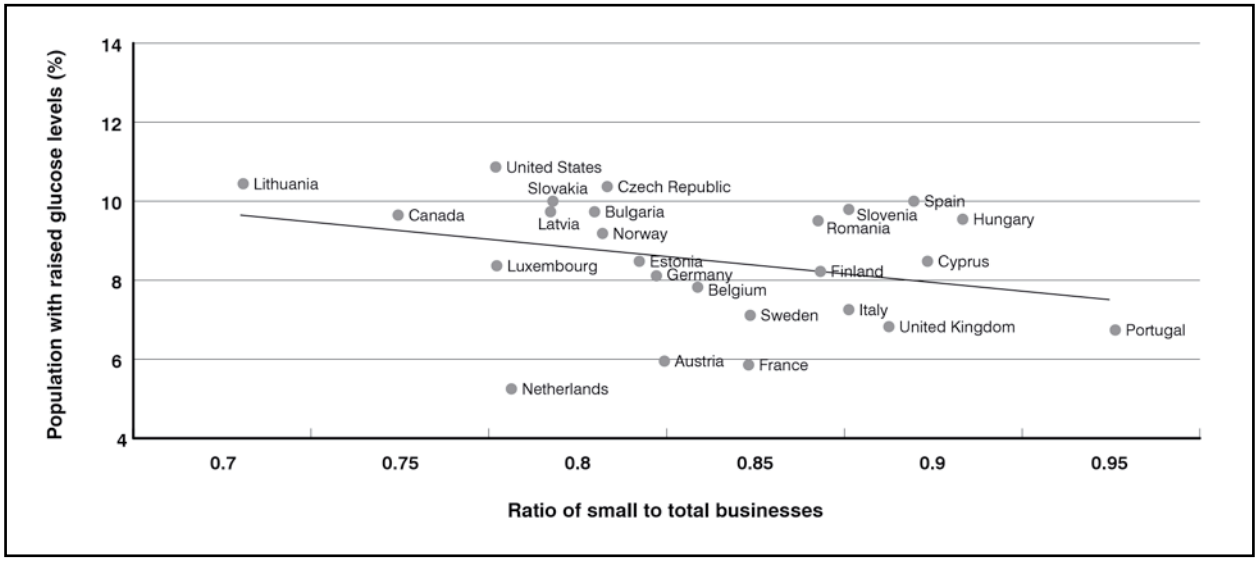

Figure 1. *Correlation between the percent of the population with raised blood glucose and the ratio of small to total businesses (Authors' calculations using 2008 raised blood glucose data from the WHO, and business count data from Eurostat, the Canadian Business Register, and the Statistics of U.S. Businesses. Actual data points listed by country. Fitted values are denoted by the grey regression line. The raw correlation is -0.309)*

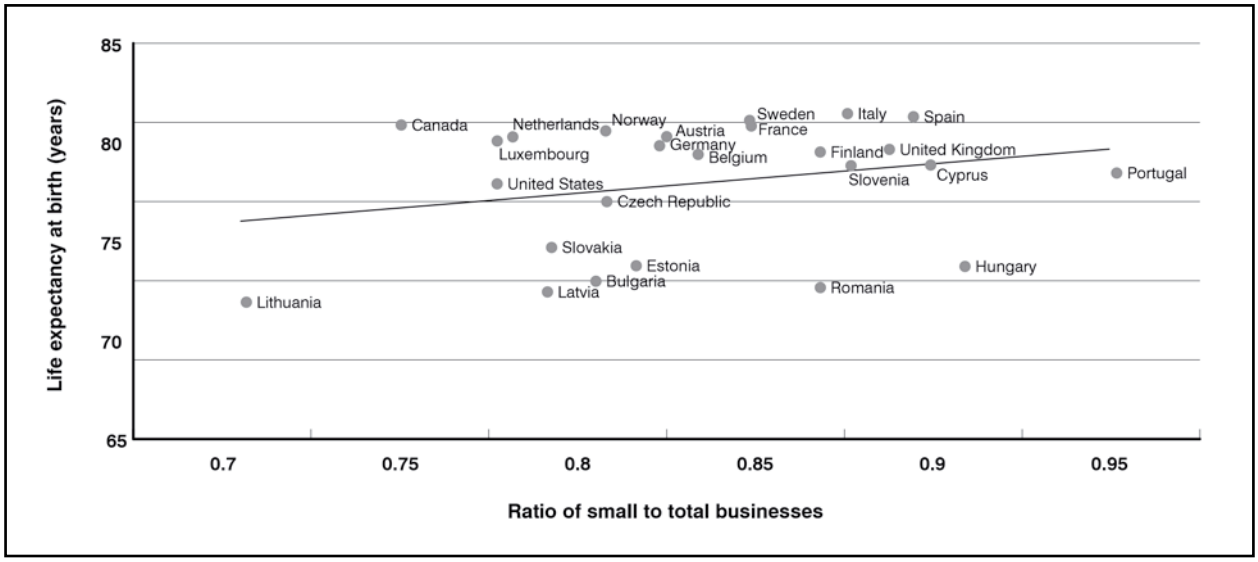

Figure 2. *Correlation between life expectancy (at birth) and the ratio of small to total businesses (Authors' calculations using 2008 life expectancy data from the world bank, and business count data from Eurostat, the Canadian Business Register, and the Statistics of U.S. Businesses. Actual data points listed by country. Fitted values are denoted by the grey regression line. The raw correlation is 0.2365)*

health) remains after conditioning on income and public health expenditure. The following model is estimated, by OLS, for each health indicator:

$$HEALTH_c = b_0 + b_1 * RATIO_c + b_2 * GDP_c + b_3 * PUBLIC_c + d * X_c + u_c$$

where c is indexed across countries, RATIO represents the ratio of small to total businesses, GDP (measured in 1000s) refers to gross domestic product per capita adjusted for purchasing power parity, and PUBLIC is the percent of total health expenditure paid for by the public sector. X represents a set of additional covariats that (in various specifications) can include age standardized obesity rates and risk factors (such as age-standardized estimates the percent of the adult population that are insufficiently active, the percent of the adult male population that have an alcohol disorder, and the percent of the adult male population that currently smoke any tobacco product), or alternatively the unemployment rate, population dependency ratio, air pollution, Gini coefficient, ratio of health expenditure to GDP, predicted mean years of schooling, and percent urban. Finally, u is the country specific error term. HEALTH is measured first by age adjusted diabetes rates, then by life expectancy at birth.

Table II depicts coefficient estimates from linear regressions of diabetes rates on the ratio of small to total businesses, among other covariates. In column (2) we observe that the significant negative relationship between market structure and diabetes rates persists, even after controlling for GDP per capita and public percent of health expenditure. A significant association also remains when we include obesity rates, in column (3), and when we control for health risk behaviours, in column (4). Coefficients on the risk factors are not reported in column (4), but are all statistically insignificant. Conversely, GDP per capita has a significant negative correlation with diabetes rates in most specifications. It should be noted that, by itself, public percent of health expenditure has a small negative association with diabetes, but this association disappears once obesity rates are included in the specifications. Obesity rates, as one would expect, exhibit a strong and significant association with diabetes, but do not severely mitigate the coefficient on the ratio of small to total businesses. The estimated coefficient on the relationship between market structure and diabetes ranges from just over -10.8 to just over -7.9, with the latter estimate arising from the preferred specification. Using this preferred specification, column (3), the predicted percent of the population with raised blood glucose is 9.42% for a country with the lowest ratio of small to total businesses, 0.71, and all other characteristics at the mean. This percent falls to 7.51% for a country with the highest ratio of small businesses, 0.95, *ceteris paribus*. This 1.91 percentage point difference in predicted diabetes rates covers just over one third of the difference between the maximum and the minimum diabetes rates.

Turning to Table III, we note similar results when our health outcome variable is life expectancy instead of diabetes. The association between life expectancy and market structure is positive, and is significant when the specification includes controls for GDP per capita and public percent of health expenditure. The strong significant association remains even with controls for obesity rates; however incorporation of controls for risk factors (alcohol disease in particular) lowers the strength and the significance of the estimated coefficient on market structure. In the more parsimonious specification, the coefficient estimate is above 21, whereas the larger spe-

	(1)	(2)	(3)	(4)
Ratio of small to total businesses	-8.8839* (4.9249)	-10.8273# (4.3460)	-7.9496# (3.7995)	-8.7981* (4.6451)
GDP/capita (PPP) in 1000s	--	-0.0333* (0.0191)	-0.0427# (0.0159)	-0.0625 (0.0335)
Public % of total Health Expenditure	--	-0.0381* (0.0213)	0.0085 (0.0191)	0.0074 (0.0315)
Obesity rate (age standardized)	--	--	0.2808° (0.0643)	0.2777° (0.0607)
Risk Factors	No	No	No	Yes
Constant	15.8384° (4.1480)	21.2067° (3.6824)	9.5703* (5.1146)	9.7680 (6.1351)
R^2	0.0956	0.2636	0.6616	0.6781
Observations	25	25	25	22

Table II. *OLS Regressions of the percent of the population with raised blood glucose on the ratio of small to total businesses and other covariates. Estimated coefficients listed with standard errors in parentheses underneath. All regressions report robust standard errors. Significance at the one, five and ten percent level are denoted by °, #, and * respectively*

	(1)	(2)	(2a)	(3)	(4)
Ratio of small to total businesses	8.6090 (12.218)	22.0222° (7.3442)	23.3531° (7.2415)	21.7603° (7.3340)	9.9442° (5.8822)
GDP/capita (PPP) in 1000s	--	0.1869° (0.0563)	0.1869° (0.0584)	0.1921° (0.0575)	0.2825° (0.0451)
Public % of total Health Expenditure	--	0.0248 (0.0236)	0.0127 (0.0255)	-0.0131 (0.0299)	0.0355 (0.0302)
Obesity rate (age standardized)	--	--	--	-0.1555 (0.1001)	-0.0571 (0.0561)
Risk Factors	No	No	No	No	Yes
Years	2008 & 2009	2008 & 2009	2008 only	2008 only	2008 only
Constant	70.8619° (10.3646)	52.4209° (6.7300)	51.9903° (6.5477)	58.4308° (8.1036)	67.6754° (7.3588)
R^2	0.0218	0.5944	0.6099	0.6398	0.9171
Observations	50	50	25	25	22

Table III. *OLS Regressions of life expectancy (at birth) on the ratio of small to total businesses and other covariates. Estimated coefficients listed with standard errors in parentheses underneath. All regressions report robust standard errors, clustered at the country level for columns (1) and (2). Significance at the one, five and ten percent level are denoted by °, #, and * respectively.*

cification results in a coefficient estimate just below 10 which is significant at the 11% level (respectable given our small sample). However, it should be noted that there is a significant time span between the measure of alcohol disease (2004) and the health outcome and market structure measures (2008). Using the preferred specification (column 3) to predict health outcomes, again we note large differences across market structure. Predicted life expectancy in a country with a ratio of small to total businesses at 0.71 is 75.26 years, compared to a country with a ratio of 0.95 where predicted life expectancy is 80.48 years. This difference, of nearly five years, is close to half of the maximum cross-country difference in life expectancy.

For both health outcome variables, we consider whether results are robust to the addition of alternative control variables. One at a time, we add the following covariates to our preferred specification: the unemployment rate, population dependency ratio, air pollution, Gini coefficient, ratio of health expenditure to GDP, predicted mean years of schooling, and percent urban. The coefficient estimates for market structure remain large and negative and, for the majority of the specifications, are significant at the ten percent level or better.

Finally, we investigate the sensitivity of our estimates to the inclusion of the U.S. and Canada. As stated previously, the target population and the reporting of business demographics varies across country, but Canada has a particularly disparate report of business demographics as the data is based at the establishment, rather than at the firm or enterprise level. Table IV reports the results of the sub-sample analysis. In the first column, the sample is restricted to exclude Canada, and we note that the estimated association between market structure and diabetes rates remains relatively unchanged. Likewise, if

	Dependent variable: % of population with raised blood glucose		Dependent variable: life expectancy at birth (years)
	Sample excludes Canada	Sample excludes Canada & U.S.A.	Sample excludes Canada
Ratio of small to total businesses	-7.8268* (4.0477)	-7.8993* (4.1813)	26.5818° (6.2240)
GDP/capita (PPP)	-0.0427# (0.0162)	-0.0422# (0.0190)	0.1893° (0.0525)
Public % of total Health Expenditure	0.0085 (0.0192)	0.0075 (0.0227)	-0.0106 (0.0321)
Obesity rate (age standardized)	0.2805° (0.0640)	0.2823° (0.0684)	-0.1707 (0.1087)
Constant	9.4694* (5.2812)	9.5551* (5.3745)	54.4669° (7.3126)
R^2	0.6540	0.6610	0.7022
Observations	24	23	24

Table IV. *OLS Regressions of dependent variable on the ratio of small to total businesses and other covariates, with restricted samples, using the preferred specification (column 3). Estimated coefficients listed with standard errors in parentheses underneath. All regressions report robust standard errors. Significance at the one, five and ten percent level are denoted by °, #, and * respectively*

both Canada and the United States are excluded from the data (second column), a remarkably similar coefficient estimate persists. The third and fourth columns depict the results from regressing life expectancy on the ratio of small to total businesses, and other covariates, in samples that exclude Canada and North America respectively. Again, results are substantively similar. Therefore, we are fairly confident that our results are not an artefact of the differences in reporting standards across country.

DISCUSSION

The results presented here suggest that there is a relationship between market structure and health that bears further investigation. Although this research does not identify a causal direction or specific pathway between market structure and health, the magnitude of the correlations suggests market structure is a worthwhile subject for future health research. A causal relationship would be suggestive of two broad policy approaches to improving national health: policies aimed at influencing market composition itself, and policies aimed at changing the work environments and the loss of social capital associated with supersized market structure.

In addition to the issue of causality, there are several other issues which we are unable to address in this study. First, we are unable to control for childhood or early life health factors. But existing research suggests that such controls are important since disease onset later in life is associated with childhood health [46,47]. Finally, we are aware that health gradients may vary along the income distribution, and this variation is a growing area of interest, particularly in Europe. Unfortunately the sample size in this study is too small for meaningful analysis along income quintiles. We suggest further microdata studies could shed light in this area.

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