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Demand, Competition and Redistribution in Swedish Dental Care

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ECONOMICS AT UPPSALA UNIVERSITY

The Department of Economics at Uppsala University has a long history. The first chair in Economics in the Nordic countries was instituted at Uppsala University in 1741.

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Abstract

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Essay 1: Individuals with higher socioeconomic status (SES) also tend to enjoy better health. Evidence from the economics literature suggests that a potential mechanism behind this "social health gradient" is that human capabilities, that form SES, also facilitate health-promoting behaviors. This essay empirically investigates the significance of socioeconomic differences in health behaviors, using dental care consumption as an operationalization of health investments. I focus on adults at an age where lifetime trajectories for SES can be taken as given and use lifetime income to capture SES. I estimate the impact of lifetime income on dental care consumption and find robust evidence that the social gradient in dental care consumption steepens dramatically over the life-cycle. Considering that dental care consumption only reflects a small part of individuals' health investments the results suggest that lifetime effects of SES on health behaviors could be substantial in other dimensions.

Essay 2: This essay studies the effect of competition on prices on a health care market where prices are market determined, namely the Swedish market for dental care. The empirical strategy exploits that the effect of competition differs across services, depending on the characteristics of the service. Price competition is theoretically more intense for services such as examinations and diagnostics (first-stage services), compared to more complicated and unusual treatments (follow-on services). By exploiting this difference, I identify a relative effect of competition on prices. The results suggest small but statistically significant negative short-term effects on prices for first-stage services relative to follow-on services. The results provide evidence that price-setting among dental care clinics responds to changes in the market environment and substantial effects of competition on prices over time cannot be ruled out.

Essay 3: The Swedish dental care insurance subsidizes dental care costs above a threshold and becomes more generous as dental care consumption increases. On average, higher-income individuals consume more dental care and have better oral health than low-income individuals. Therefore, the redistributional effects of the Swedish dental care insurance are ambiguous *a priori.* I find that the dental care insurance adds to the progressive redistribution taking place through other parts of the Swedish social insurance (SI) for individuals aged 35-59 years whereas it reduces the progressivity in the SI for those aged 60-89 years. While the result for the oldest individuals is problematic from an equity point of view, the insurance seems to strengthen the progressitivy of the Swedish social insurance for the vast majority of patients.

Keywords: Health, dental care, Grossman model, socioeconomic status, health disparities, social health gradient, competition in health care, public health insurance, dental care insurance, social insurance, redistribution.

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For Robert

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As a four-year-old I wanted to be a bus driver so that I could drop of my future kids at day care while working. It may seem clear that a kid with that kind of interest in efficiency would end up an economist but the road hasn't been straight and I wouldn't be where I am today without the help and encouragement of the people around me.

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Stockholm, November 2015
Gabriella Chirico Willstedt

Contents

Introduction

"Life is better now than almost any time in history."
– Angus Deaton, *The Great Escape.*

The quote is the opening line from Angus Deaton's book "The Great Escape: Health, Wealth and the Origins of Inequality" (2013a) telling the story of why our lives are longer, healthier and wealthier than it used to be. Deaton also tells the story of those who are left behind as "the tale of progress is also the tale of inequality" (Deaton, 2013a, p. xii). Throughout history, the "great escapes" from poverty and depravation has made nations prosper but at the same time inequalities have increased, not least in terms of health. As Deaton has noted elsewhere, "when health improvements come through innovation and new knowledge, the first beneficiaries are likely to be those with the understanding and wherewithal to adopt them, which will usually be the better educated and better off" (Deaton, 2013b, p. 265).

Economists' interest in health can somewhat simplified be understood from two perspectives. The first is that health is an important part of our wellbeing, not just because we enjoy being healthy but also because health is part of our human capital and thus affects our capability of leading the kind of life we want to lead. Health is therefore closely related to lifetime opportunities and consequently affects the distribution of welfare. As economists generally are interested in human progress and prosperity (or most definitely should be!) it is quite natural to also focus on the determinants of health. And, "perhaps surprisingly", as suggested by Glied and Smith (2011), economics as a discipline has made important contributions to our understanding of what makes people healthy. From Grossman's (1972b) theoretical model of health production to the fairly recent contributions on the long-term health effects of early life conditions made by e.g. Almond and Currie[1] and Cunha and Heckman[2] to mention a few.

The second, and clearly interrelated, perspective is that the health sector makes up a large part of developed economies today. In the Netherlands, France, Belgium, Germany, Denmark and Austria health care spending exceeded 10 percent as a share of GDP in 2012 (Eurostat, 2015). The corresponding figure for Sweden was 9.6 percent (OECD, 2014). While average growth in health care spending is decreasing, the demographic trend with more people living longer will most likely place a tremendous strain on the systems for financing and providing care services in the future. This, in turn, poses a challenge for governments to increase efficiency in the welfare systems at large. In the light of these developments, many OECD countries have taken steps towards a more market-oriented health service sector, which has been studied carefully by industrial organization economists.

This thesis consists of three self-contained essays dealing with different aspects of the economics of health from the perspectives discussed above. The essays are

[1] Some of which are reviewed in Currie and Almond (2011).
[2] Outlined briefly in Heckman (2007).

focused around the themes demand (essay 1), competition (essay 2) and redistribution (essay 3) and the empirical application throughout the thesis is dental care in Sweden. All three essays study behaviors, either on behalf of the individual as a consumer of dental care and producer of health, or on behalf of the supplier of care services. Essay 1 investigates the relationship between income, as one dimension of socioeconomic status, and investments in health in the form of dental care consumption. The essay relates to the bigger question about how we can understand the well-documented positive relationship between markers of socioeconomic status and health—the social health gradient—resulting in the inequalities addressed by Deaton (2013a). Essay 3 also deals with the relationship between income and dental care consumption, but from the perspective of what this relationship implies for redistribution within the Swedish dental care insurance. The starting point is the theoretical concept of public health insurance as a means of redistribution and thus a potential way of alleviating the consequences of the social health gradient. Essay 2 turns to the supply side and studies price competition on the Swedish dental care market as a way of increasing our understanding of health service markets.

I find dental care and oral health to be an interesting application for investigating all these behaviors. First, there is no reason to believe that disparities in oral health related to socioeconomic status should differ systematically from disparities in general health. Second, dental care is a suitable application for studying individual behavior in relation to health as oral diseases—to a large extent—can be avoided by preventive measures (Coulter *et al.*, 1994). Dental care consumption therefore constitutes an important part of maintaining a good oral health. Third, the Swedish dental care market is a suitable setting for investigating the effects of competition in a health service market as patients have a substantial cost share and prices are market determined. This institutional setting differs from the US hospital market—the most active area in the literature on competition in health care—where e.g. prices are set through hospital-insurer contracts.[3] Fourth, the Swedish dental care insurance is an interesting setting for studying redistributional features within a public health insurance as the insurance subsidizes care that is predominantly supplied through private clinics and patients, as mentioned, make fairly large co-payments.

The social health gradient

The social health gradient, i.e. the positive relationship between health outcomes and markers of socioeconomic status, is a salient feature of all developed countries. Cutler *et al.* (2011) find that household income protects against 5-year mortality in all age-groups among US adults over the age of 25. In addition, Case and Deaton (2005) find that both men and women in the bottom income quartile in the US are significantly more likely to report being in poor health compared to their wealthier counterparts. Case and Deaton (2005) also finds that self-reported health among those in the bottom income quartile deteriorates faster compared to those in the top which results in a widening of the income gap in health over the life-cycle. The patterns are similar in Europe. A consortium on health inequalities in the EU (European Union, 2013) found

[3] See e.g. Gaynor and Town (2011) for a survey of the literature on competition in health care markets.

a steep social gradient between material deprivation and adverse health outcomes in 2010. Self-reported poor health or long-standing health problems become increasingly more frequent when moving down in the distribution of socioeconomic status, whether measured by education, income or material deprivation. Maskileyson (2014) reports results for Sweden and finds a positive and statistically significant association between family wealth and health status measured by a severity-weighted index of several self-reported measures. The size of the association is not statistically different from estimates for Germany, the Czech Republic, the UK or Israel, suggesting similar social health gradients despite substantially different welfare-regimes.

A large body of literature has emerged in economics during the past decades, focusing on the evolution of human capabilities throughout life as a way of understanding the origins of socioeconomic inequalities (outlined in e.g. Cunha *et al.*, 2010). This research agenda is motivated by evidence of early life conditions having a substantial impact on health and economic outcomes later in life.[4] One dimension of the pathway from conditions in the beginning of life to adult health is the effect on subsequent biology; it is now widely recognized that e.g. coronary heart disease and type 2 diabetes, in part, is determined by gene-environment interactions early in life (Gluckman and Hanson, 2006). Another dimension is behavioral and builds on the notion that the same processes that form human capabilities and ultimately socioeconomic status also form individual's health behaviors. Heckman (2007) reviews the evidence of early life conditions affecting the formation of capabilities in childhood which, in turn, affects skill-attainment later in life. The process is dynamic in the sense that skills and abilities attained early in life serve as a "production technology" to attain further capabilities later in life and therefore "skill beget skill". In addition, Cunha and Heckman (2007) suggests that individual's stocks of skills "facilitate the accumulation of health capital through self-regulation and choices" (Cunha and Heckman, 2007, p. 45). An important insight from this literature is therefore that the emergence of the social health gradient should be understood from a life-cycle perspective and that disadvantages, originating in early life conditions, may be amplified by differences in behaviors. However, little is known about the empirical significance of these differences as health behaviors are generally not observed by researchers.

In **Essay 1**, I utilize the detailed Swedish register data on dental care consumption and oral health to empirically investigate the significance of socioeconomic differences in health behaviors. The concepts of the Grossman model (1972a, 1972b) serves as a theoretical framework for the empirical analysis. The model introduced the notion of health as a capital stock. In order to maintain or increase the size of the stock, individuals can invest in their health by undertaking any health promoting behavior. I use dental care consumption as an operationalization of health investments and focus on adults aged 35-64 years, an age where most have completed their education and settled into a career path. This suggests that lifetime profiles in terms of socioeconomic status (SES) can be taken as given and be measured by lifetime incomes. The first part of the empirical analysis estimates the relationship between lifetime income and oral

[4] For reviews of the literature on the effects of early childhood and *in utero* environments on human capital and skill formation see e.g. Currie (2009), Almond and Currie (2011), Currie and Almond (2011) and Cunha *et al.* (2006). The idea of long-term effects of *in utero* environments originates in epidemiology and is sometimes referred to as the "fetal origins hypothesis", or the "Barker hypothesis" after Professor David J. P. Barker.

health and dental care consumption respectively. The analysis is performed separately by age-groups to take the age-related depreciation of health into account, and highlights four salient patterns. First, in line with Grossman's model, oral health decreases while dental care consumption increases with age. The Grossman model (2000) assumes that individuals' stocks of health deteriorate faster as they grow older which is to say that older individuals, on average, are less healthy than younger individuals, all else equal. At the same time, because of the increasing depreciation of health, individuals need to make relatively larger health investments to maintain the health stock. Age therefore affects the demand for health and investments in opposite directions; the demand for health decreases with age whereas the demand for health investments increases. Second, oral health decreases faster for individuals in the bottom quartile of the income distribution compared to those in the top. Third, individuals with higher incomes consume more dental care at all ages. Finally, the income gap in both oral health and dental care consumption widens substantially as individuals grow older.

In the second part of the analysis, I estimate the effect of lifetime incomes on dental care consumption and condition the analysis on oral health. This is done to account for the inherently dynamic process of accumulating oral health capital; dental care consumption affects oral health which affects consumption and so on. The results paint a clear picture of how differences in dental care consumption related to socioeconomic status increases monotonically over the life-cycle. The lifetime patterns are striking; from midlife to the years before the legal retirement age, the estimated effect of lifetime income on dental care consumption increases by a factor of 4.8 for men and 2.7 for women. Considering that dental care consumption is only one dimension of individual's health behaviors, the results indicate that lifetime effects of socioeconomic status can be even larger when considering other dimensions.

While I cannot determine the precise mechanisms giving rise to the documented gradient in oral health, the results support the notion that differences in health behaviors may account for part of it. Taken together with the general conclusion from the literature on human capability formation that early life conditions have a significant effect on both socioeconomic status and health, the results suggest that policies aimed at addressing inequalities in lifetime opportunities in general are most likely to succeed. This argument is reinforced by the literature[5] that exploits wealth shocks in the form of e.g. lottery winnings, and generally find no causal effect of income *as such* on health.

The market as a way of supplying care

Many OECD countries have undertaken market-oriented health care reforms over the past decades (Gaynor, 2012). Some reforms have been motivated as a way of increasing consumer choice. Others have been motivated as a means of cost control since introducing market mechanisms into the provision of health care is assumed to strengthen incentives for providers to become more efficient (Docteur and Oxley, 2003). At the same time, it is often argued that the special features of health care have implications for the scope for competition. The development towards market-oriented reforms therefore raises questions about when and how competition works on health

[5] See e.g. Apouey and Clark (2014), van Kippersluis and Galama (2014) and Cesarini *et al.* (2015).

care markets. In **Essay 2**, I study the effect of competition on prices on the Swedish market for dental care, a setting where patients have a substantial cost share (on average about 80%) and prices for health care services are market determined.

The empirical strategy exploits that competition—theoretically—has different effects across service types due to differences in consumers' price sensitivity. More precisely, competition has greater effects on informative services, such as examinations and diagnostics, compared to more complicated, therapeutic services. By exploiting this difference, a relative effect of competition on prices is estimated. The reduced form results show small but statistically significant effects of competition on prices for first-stage services relative to follow-on services. Competition is measured as the number of clinics within a fixed distance from each clinic. The main results suggest that a 1% increase in the number of clinics is followed by a 0.024% decrease in prices for basic examination and diagnostics relative to tooth extractions. The results are robust across analyses of different kinds of services and model specifications. The effects are small, but should be interpreted as short-term effects of increased competition. Consequently, substantial effects of competition on prices over time cannot be ruled out.

A possible concern with the result is that clinics, in response to increased competition, lower prices for informative services while increasing prices for therapeutic services. To investigate whether this is the case, the absolute effect of competition is assessed through simulations, based on the estimates of the relative effect. The simulations suggest that the absolute effect of competition on prices is negative for both informative and therapeutic services. Hence, the results suggest that there is room for price decreases in the Swedish market for dental care and that increased competition would imply a redistribution of welfare from sellers to buyers by lowering prices.

The conclusion is that increased competition is followed by an increased price difference between informative and therapeutic services. The results therefore provide evidence of strategic behavior of clinics in the sense that their price-setting indeed responds to changes in the market environment. The effects are small, but substantial effects of competition on prices over time cannot be ruled out. The assessment of the absolute effects suggests that increased competition lowers prices for both types of services. Furthermore, the simulations do not suggest that clinics fully compensate price decreases for examinations and diagnostics with price increases for more complicated and uncommon services. This implies that competition increases welfare for consumers in the short run. However, the increase is moderate. All results are statistically significant and robust for sensitivity analyses.

Public health insurance as a means of redistribution

Public health insurance systems are commonly justified on grounds of equity and as a means of redistributing welfare from high-income individuals to low-income individuals. The case for public health insurance as an instrument for redistribution has been studied carefully theoretically. Blomqvist and Horn (1984), Rochet (1991), Cremer and Pestieau (1996) find that health insurance, as a complement to income taxation, can achieve redistribution more efficiently than distortionary income taxes alone. This result is developed in models where income is assumed to be negatively

related to health risks. While this assumption is empirically sound, the argument abstracts from a setting where the care that is covered by the insurance is more than a "repair technology", i.e. has value for the individual beyond its restoring effect on health. In fact, dental care consumption increases with incomes whereas individuals with higher incomes also tend to have better oral health, on average. **Essay 3** investigates the redistributional features of the Swedish dental care insurance.

The insurance includes cost-sharing subsidies for dental care costs above a threshold, at two different rates depending on the value of consumed care over a given period. The size of the subsidy increases with dental care costs implying that the generosity of the insurance increases with consumption. The insurance constitutes a small part of the relatively large Swedish social insurance system and, therefore, redistribution within the dental care insurance is defined as whether or not it adds to the progressive redistribution taking place through other parts of the social insurance.

The empirical analysis is guided by Grossman's framework (1972a, 1972b, 2000) in which individuals are assumed to demand dental care because it serves as an input in the production of oral health. Given that oral health is a normal good, the demand for both oral health and dental care increases with incomes. The Grossman model therefore provides a theoretical foundation for the documented positive relationship between income and oral health as well as investments in oral health in the form of dental care consumption.

The empirical strategy exploits that the insurance scheme consists of three different segments; one where individuals pay market prices and two where dental care is subsidized. Consumption below the first threshold provides information on how consumption varies with income under market prices. Consumption above this threshold also provides information on how consumption varies with income, but under subsidized prices. The empirical analysis investigates if the consumption response to the insurance, i.e. the lowered price, varies with income. The analysis covers all individuals in Sweden aged 35-89 years with positive dental care consumption during the period July 2008-December 2011.

I find that individuals with different incomes respond differently to the insurance. For individuals aged 35-59 years, the dental care insurance adds to the progressive redistribution of the social insurance system; as we move up in the income distribution, individuals move from the consumption segment where dental care is subsidized to the segment where they pay market prices. Higher-income individuals aged 35-59 year are thus more likely to bear the full cost of their dental care consumption compared to lower-income individuals. At the same time, the dental care insurance reduces the progressivity in the social insurance system for those aged 60-89 years. This is problematic from an equity point of view as the positive relationship between income and oral health is stronger among those aged 65 years or above. Moreover, it is reasonable to assume that the oral health stock deteriorates faster as an individual age suggesting that older individuals will have a greater need for dental care. It is however noteworthy that the dental care insurance makes redistribution through the Swedish social insurance system more progressive for the vast majority of patients. This finding may be surprising to some, as dental care in Sweden stands out in the welfare sector by having pronounced market elements such as free price-setting and fairly large private co-payments and such arrangements are often questioned on the basis of equity concerns.

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