Inequality's Economic and Social Roots: the Role of Social Networks and Homophily

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Abstract

I discuss economic and social sources of inequality and elaborate on the role of social networks in inequality, economic immobility, and economic inefficiencies. The lens of social networks clarifies how the entanglement of people's information, opportunities, and behaviors with those of their peers and communities leads to persistent differences in outcomes across groups in education, employment, health, income and wealth. The key role of homophily in dividing groups within the network is highlighted. A network perspective's policy implications differ substantially from a strictly economic perspective. I discuss the importance of "policy cocktails" that include aspects that are aimed at both the economic and social forces driving inequality.

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Look over our vast city, and what do we see? On one side a very few men richer by far than it is good for a man to be, and on the other side a great mass of men and women struggling and worrying and wearying to get a most pitiful living.
Henry George, October 5, 1886.

1 Introduction

Given how pervasive and persistent inequality is – across settings, demographics, and time – we should expect it to be driven by many forces, both independently and in concert.

For example, the economics literature has detailed how several different economic forces lead to inequality: excess returns to capital, monopoly rents, market imperfections that limit people's ability to acquire human capital, as well as various forms of discrimination.[1] Similarly, there are many writings on the sociology and psychology of inequality, including factors such as social stratification, institutional segregation, group competition, racism and sexism, and cultural hegemony.[2] Even taken altogether, this wide variety of factors still misses an important perspective on inequality, and is missing key roots of the problem for many people. These roots trace to the interplay between social structures and economic behaviors, such as how homophily in social networks constrains economic behaviors in labor markets, education, and other investments.

The purposes of this essay are: to provide a high level overview of many factors – both economic and social – driving inequality and how they fit together; and to highlight the interaction of social structure with economic behaviors. Taking this wider perspective, accounting for the interaction between social structure and economic opportunities and behaviors, provides a richer understanding of how and when inequality can be systematically addressed by policies, and how policies can be better structured to take advantage of that interaction.

In particular, humans are a heavily social species. This social structure has enabled us to specialize and advance far beyond what any one of us can produce (Henrich, 2015), but with that also comes a heavy dependence upon others. We are dependent upon our social networks[3] for information, opportunities, and norms of behavior. These dependencies tie people's fates to the fates of their friends, families, and acquaintances.

Understanding when and why this dependency leads to inequality and immobility involves understanding that it occurs in strongly divided networks. Given that people depend on their networks for information and opportunities, divisions in a network lead information

[1]For some background, see Atkinson (1975); Bourguignon and Morrisson (2002a); Bowles and Gintis (2002); Heathcote, Perri, and Violante (2010); Banerjee and Duflo (2011); Benhabib, Bisin, and Zhu (2011); Heckman and Mosso (2014); Atkinson (2015); Alvaredo, Chancel, Piketty, Saez, and Zucman (2018); Benhabib and Bisin (2018); Smith, Yagan, Zidar, and Zwick (2019). Many additional references on specific topics appear below.

[2]See Hurst, Gibbon, and Nurse (2016); McCall (2001); Roberts and Rizzo (2020) for some background and references.

[3]Throughout what follows, I use the term "social network" broadly to encompass a person's friends, neighbors, acquaintances, colleagues, and peers, and not to refer to a social media platform.

and opportunities to stay concentrated within parts of the society and not reach other parts. For example, if none of a person's friends are employed in a given industry and job interviews come via referrals inside that industry, then that person is effectively shut out of the industry. The strong divisions and homophily that characterize social networks – that is, the tendency of people to associate with others who are similar to themselves – imply that different parts of a network can have very different information, access, and cultures. This provides a foundation for persistent inequality, and operates through many channels including employment, but also other things like education and other investments.

Here, I first provide an overview of key economic drivers of inequality - concentration of wealth and capital and increasing returns to investments, imperfect competition and rents to monopolies, frictions in borrowing and constraints in development of human capital, other forms of poverty traps, and discrimination. The first two of these help explain some aspects of wealth inequality, while the others provide insights into wider-spread differences in incomes. Developing a fuller understanding of inequalities in incomes requires adding social structures to help see how networks drive and sustain differences in employment, wages, and education. Thus, I turn discuss how divides in social networks can lead to three key forces behind inequality: unequal access to jobs, unequal distributions of awareness of opportunities and information about how to take advantage of them, and differences in norms and cultures.[4] The divides in networks that underlie these effects derive from the prevalence of homophily: people's tendencies to associate with others of similar demographics and backgrounds. The fact that networks tie younger cohorts together with older cohorts, leads inequality to reproduce itself across generations, with the same groups being disadvantaged over time. That provides key insights behind the tight relationship between inequality and its persistence: immobility. This is a sort of social capital complement to the usual financial capital inheritance story. It also helps us understand why inequality is also costly for society in general due to the lost production when some people's talents and abilities are not well developed or realized.

The importance of distinguishing the variety forces behind inequality becomes most clear when we turn to the discussion of policies for overcoming inequality. Many of the economic drivers can be addressed by redistribution, regulation, and subsidies. However, those policies do not eliminate the social drivers and hence can leave long-term inequality and economic immobility largely unaffected. Social factors and unequal distribution of social capital require policies that overcome informational frictions and divides in networks, and take advantage of the feedback effects and social multipliers inherent in networks. These include mentorships, internships, affirmative action, and subsidizing education. Lessons from network formation

[4]Coleman (1988) discusses three forms of social capital that are important in the development of human capital. There is some parallel between two of the three types of interactions here, and two of Coleman's three types of social capital. Inequality in network positions can be thought of as forms of inequality in social capital. Jackson (2020) offers more background and references on social capital and how networks relate to various forms of it. Here the focus is instead on how homophily in networks affects three types of interactions and how those drive inequality.

and homophily also suggest important ways in which the structuring of schools and other institutions can be better designed to lower homophily and improve the reach of people's networks.

Key roles of social networks as a driver of inequality are discussed in an excellent antecedent to this paper by DiMaggio and Garip (2012) (see also DiMaggio and Garip (2011)). My focus is broader on some dimensions, including discussion of economic drivers of inequality, and more extensive on other dimensions, such including the discussion of the relationships between inequality, immobility, and productive inefficiencies. I also discuss the different policy implications of the variety of forces underlying inequality.

2 Background

Before proceeding to discuss the drivers of inequality, it is useful to briefly discuss a few key facts about inequality and why we care about it.

As is clear from Henry George's quote above, systemic inequality has been endemic for centuries. In fact, we see it going back millennia and across most societies – for instance, in the contrast between the more than one hundred kilograms of gold that plated King Tutankhamun's innermost coffin and the plain graves of the workers who built his tomb. Lui Jin, a key courtesan during the Ming Dynasty, died with hundreds of thousands of kilograms of gold, while the much of his society's booming population had no property or savings at all. Nicolas Fouquet's stunning Château de Vaux-le-Vicomte earned the envy and ire of Louis XIV and inspired the Château de Versailles, at the same time that repeated famines ravaged France. John D. Rockefeller's ruthless monopoly amassed more than a billion dollars when the per capita income in the US was on the order of a hundred dollars a year.

As systematic data have become more available over recent decades, we have increasingly sharp and broad measures of the extent and dynamics of inequality and economic immobility,[5] as well as their prevalence across societies and geography.[6]

Regardless of short and medium term trends and changes, inequality is a persistent phenomenon, and its spatial and demographic correlation patterns indicate that it is not just a chance phenomenon (Chetty, Hendren, Kline, and Saez, 2014; Corak, 2016). From our perspective, a particularly important piece of the puzzle is that inequality is closely related to economic immobility.

[5]For instance, see Bourguignon and Morrisson (2002b); Bowles and Gintis (2002); Atkinson, Piketty, and Saez (2011); Piketty (2014); Chetty, Grusky, Hell, Hendren, Manduca, and Narang (2017); Corak (2016); Saez and Zucman (2016); Hubmer, Krusell, and Smith Jr (2020).

[6]See, for example, Charles and Grusky (2005); Bowles, Smith, and Borgerhoff Mulder (2010); Corak (2013); Chetty, Hendren, Kline, and Saez (2014); Atkinson and Morelli (2014); Alfani (2021).

2.1 Inequality and Immobility

The relationship between inequality and economic immobility was crystalized by Alan Krueger in a speech in 2012 in which he depicted the "Great Gatsby Curve," built on the work of Miles Corak.[7] The observed fact is that countries with higher inequality also tend to have higher economic immobility. An updated version of the Great Gatsby Curve appears in Figure 1,[8] and it pictures the relationship between inequality as measured by an income Gini coefficient versus a measure of economic immobility as measured by intergenerational earnings elasticity (the coefficient of a regression of log of child's earnings on log parents' earnings).

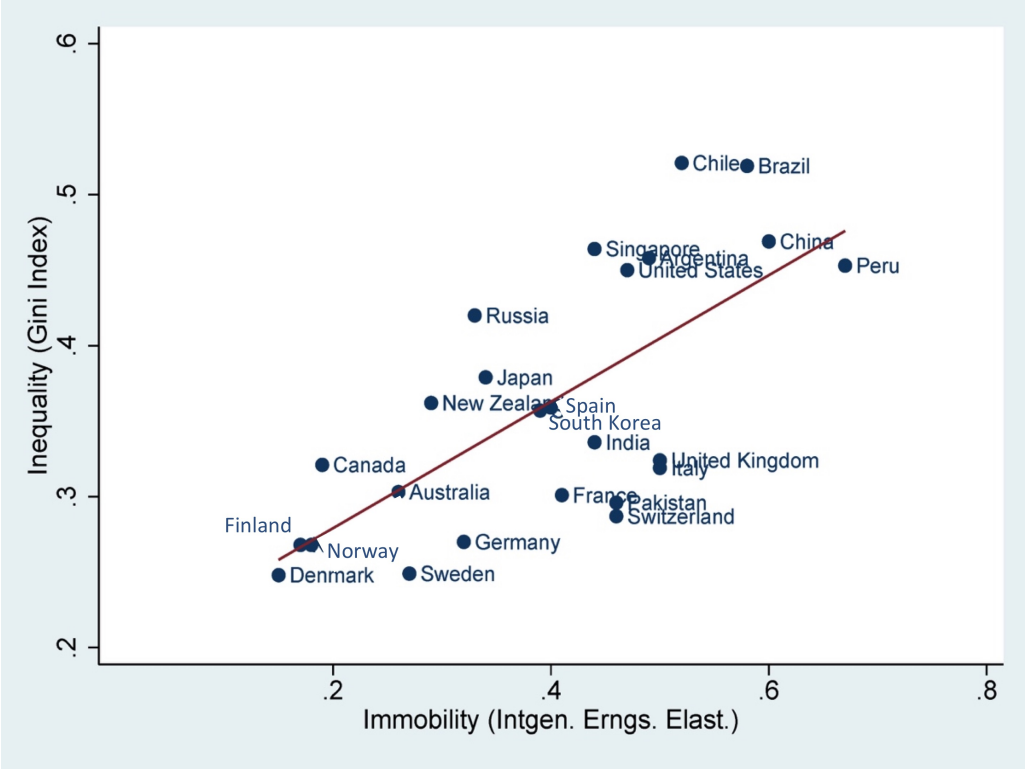

Figure 1: [The Great Gatsby Curve] Inequality (Income Gini coefficient) plotted against economic immobility (intergenerational earnings elasticity).

The correlation is observational, but growing evidence shows that there are causal aspects to it (e.g., see Section 5.2.2). Most importantly from our perspective here, the concepts behind the Great Gatsby Curve help in guiding theory and policy. People born into poor circumstances are disadvantaged in terms of their networks (social capital), as well as the financial and human capital of their families, and this can lead them to end up with worse

[7] See Corak (2013, 2016) for more background, and Andrews and Leigh (2009) for related observations.

[8] Some data are from Corak (2016), supplemented with data from the CIA World Factbook, Borisov and Pissarides (2016), and Kim (2017). I have reversed the axes from the original. This reversal conceptualizes immobility as the base force, and (recurrent) inequality as a result of it.

information and opportunities, which translate into worse outcomes. The perpetuation appears as immobility, and the disparities across communities manifests itself as inequality, but they are both features of the same phenomenon.[9]

2.2 Homophily

As homophily plays a starring role in the discussion of the social shaping of inequality, I give a brief description of the important aspects of it for our inequality discussion and refer the reader to McPherson, Smith-Lovin, and Cook (2001); Jackson (2019) for more detailed background and references.

Homophily is a relatively modern term, coined by Lazarsfeld and Merton (1954), for the long-standing phenomenon of people associating with others who are similar to themselves. To given an idea of its extent, consider an early empirical study by Verbrugge (1977). She found substantial homophily on all the characteristics in her data, including: age, years of schooling, profession, religion, marital status, and employment status. In particular, she examined 240 different categories and examined odds ratios for the closest friendship. As an example, she compared the frequency with which catholics named a catholic as their closest friend to the frequency that non-catholics named catholics as their best friend. A ratio of one corresponds to no homophily. She found that the odds ratio for the category catholic were 6.3 in Detroit and 6.8 in Alt Neustadt. All of the 240 categories she examined had odds ratios above 1, and 225 of the 240 odds ratios were statistically significantly above 1 – with odds ratios between 2.2 and 81. Indeed, this study is just one example, and it is difficult to find dimensions on which human networks are not homophilous. Homophily even extends to personality characteristics.[10] Obviously, many dimensions are correlated, but the important fact for understanding the impact of homophily is that it leads to networks in which groups can be relatively isolated from each other socially, even when they are in close proximity.

It is worth emphasizing that homophily exists for many reasons, and these become policy relevant as we discuss below. Let me mention two that are key for our purposes here (see Jackson (2019) for a more extensive overview and Currarini, Jackson, and Pin (2009, 2010) and Chetty et al. (2021) for some empirical background). One is that homophily is driven by exposure and contact patterns (Allport (1954)). For instance, students of the same age are grouped in schools together and sometimes even placed in tracks based on their prior achievements, people with similar education levels work together, and people of the same religion attend services together. Housing prices often vary by the amenities and location of neighborhoods, which can then segregate people by income. The other is that beyond exposure, people make choices about whom they interact with conditional on exposure.

[9] This relationship comes out of a variety of forces. For instance, Loury (1981); Durlauf and Seshadri (2018) discuss how it can come out investments of education across generations. Bolte, Immorlica, and Jackson (2020) show how it comes from a model of homophily and job referrals (more on this below). These generally involve some social aspect: family and community effects.

[10] See Morelli, Ong, Makati, Jackson, and Zaki (2017); Jackson, Nei, Snowberg, and Yariv (2019).

People find it easier to interact with people with whom they share a common background, as they share interests, expectations, norms of behavior. Sharing a background also correlates the challenges people face and what they can learn from each other. New parents of a certain income and education level share very similar challenges in raising their children. This distinction between exposure and choices conditional upon exposure is important not only because informed policy decisions depend on what drove the networks to form the way they did; but also because these different reasons have different consequences, as discussed below.

2.3 Why Inequality Matters

It is also important to discuss why we care about inequality, as that helps focus our attention and to frame a discussion of when and which sorts of policy interventions can be justified. The voluminous literature on the philosophy of inequality and welfare would take us on a tangent here, but it is worth mentioning a few key points.

Given how resilient and widespread inequality is, it has been a central subject of many studies in political philosophy, sociology, and economics over the decades. The roots of modern thinking trace to prominent contributions include those by Jean-Jacques Rousseau (1754; 1762), Freidrich Engels (1845), John Stuart Mill (1859a; 1869),[11] Karl Marx (1867), Henry George (1879), Max Weber (1921), John Rawls (1971), James Coleman (1974), Anthony Atkinson (1975), and Amartya Sen (1992b).[12]

At its core, concerns about inequality are often based on some notion of fairness, as well as what we might refer to as social insurance. People can end up in disadvantageous circumstances, and should not suffer for factors beyond their volition that led to those circumstances. One of the most powerful tools in framing this perspective was articulated by Rawls (1971) and is a hypothetical exercise where one imagines that they could have been born into any position of a human in the world. As Rawls states, "Among the essential features of this situation is that no one knows his place in society, his class position or social status, nor does any one know his fortune in the distribution of natural assets and abilities, his intelligence, strength, and the like. ... The principles of justice are chosen behind a veil of ignorance."

While this frames the discussion nicely in terms of endowments of natural characteristics, as well as the economic and social capital that one is born into, it can still lead to a wide variety of views on what fairness means. One way to use this as a tool to address inequality,

[11] Ironically, although "The Subjection of Women" was published with John Stuart Mill as sole author, he acknowledged that some of the text was inspired by writings and ideas of his stepdaughter Helen Taylor and that much of his writing on the subject was influenced by extensive discussions with his wife Harriet Taylor Mill. He also stated that his collaboration with his wife was extensive in the writing of "On Liberty".

[12] There are also a variety of influential works on specific forms of oppression and inequality, such as key feminist writings (e.g., Mary Wollstonecraft (1792)), and a long string of prominent abolitionist writings including those by James Ramsay, Harriet Beecher Stowe, and Frederick Douglass; not to mention various discussions of religious and ethnic oppression throughout history.

is to ask what policies would we like to implement to make the world the best possible if we look at the world from behind this veil of ignorance and realize that we could have ended up in any position in society. One possibility is to view it as a chance phenomenon, and say that we could equally likely have been anyone in the world (or even in future generations), and then ask what policies maximize the overall average welfare of the society. This is the perspective of utilitarians (e.g., Bentham (1789); Mill (1859b); Harsanyi (1977)), who weight the relative utilities or enjoyment of the benefits of different outcomes across a population. Interestingly, instead of looking at the outcomes for all positions, Rawls argued for concentrating on the welfare of the worst positions. I won't venture into that debate here. Nonetheless, regardless of what one concludes from thinking behind the veil of ignorance, it provides a justification for comparing the circumstances of different individuals and the consequences of those circumstances.

Most fundamentally, the veil of ignorance gives us a reason for a form of social insurance. If the circumstances of one's birth substantially limit the opportunities and outcomes that an individual can expect, it is too late for the individual to be able to insure against those circumstances. There are many things that can lead to unequal outcomes. For instance, some families have their house burn down and their possessions destroyed, while others do not. This is something that people can privately insure against. In contrast, being born into poverty and ending up with poor childhood health and education is not something that a person has a chance to buy private insurance against. From Rawls' perspective of the veil of ignorance, a society has a moral obligation to address those events. The individual cannot insure against the event, but society can. It requires society to do two things: one is to compensate people for the outcomes that are beyond their control, but the other is to ensure opportunities are more evenly available to people regardless of the position into which they are born.[13]

Beyond the moral underpinnings of fairness and social insurance, there are also basic economic reasons for caring about missing opportunities and frictions in a society. Missed opportunities lead to a loss of production for a society, which leads to a smaller overall pie for the society. Society loses when people's talents are under-utilized or mis-matched with their profession and other positions in society. These losses can compound over time, leading to lower growth (Persson and Tabellini (1994)[14]). At a most basic level, inequality can lead to differences in health outcomes and stress (Adler and Newman (2002)). Ill health for an individual, especially when it begins in childhood, compounds itself over time and is costly for society, both in the lost production and the resources used in the care for that

[13]The details of what this entails are something that I will not delve into here, but of course are very important. Which outcomes and situations are ones that should be the concern of a society? How much should it depend on choices and liberties afforded to the individuals. Various forms of diversity can be at odds with some notions of equality and liberty. These are the subject of important further discussions, such as that of Sen (1992a).

[14]For additional discussion see, for instance, Benabou (1996); Stiglitz (2012). The relationship between inequality and productivity is challenging to identify (Barro, 2000), but recent data offers increasing evidence for the relationship and potential channels (e.g., Berg et al. (2018); Aiyar and Ebeke (2020)).

individual. Inequality can also manifest itself in things like differences in group participation and social capital (Alesina and La Ferrara (2000); La Ferrara (2002)), which also have productive consequences. Inequality can also cause political frictions leading to less effective government, and also cause a society to focus on redistribution instead of investment (e.g., Voorheis, McCarty, and Shor (2015)).

3 Economic Sources of Inequality

Now I turn to discussing some of the sources of inequality, beginning with some of the most prominent economic ones.

3.1 Unequal Returns to the Factors of Production

A basic economic source of inequality is unequal returns to the factors of production. This can come in a variety of forms. As made popular by the studies of Piketty (2014), for instance, a greater return to capital compared to the growth of the rest of the economy – "$r > g$" – can lead those holding capital to have their wealth grow more rapidly than the rest of the society. The importance of capital and its potential role in inequality has roots in the writings of Marx (1867) and the literature that followed, but is examined from a different perspective in Piketty.

The approach of Piketty echoes the theory that Henry George presented in his book "Progress and Poverty" (1879), which was one of the most widely sold books in the world up to the end of the 19th century. It also concerns the idea that inequality can be driven by certain factors of production earning higher returns than others. However, instead of capital, George's focus was on rent: the returns to owning land. He noted that people owning land earned much more from its cultivation than the people who worked the land. George works at explaining *why* one should expect a disparity. In particular, he asks (Chapter 11, George (1879)) "To say that wages remain low because rent advances is like saying that a steamboat moves because its wheels turn round. The further question is, what causes rent to advance? What is the force or necessity that, as productive power increases, distributes a greater and greater proportion of the produce as rent?" The answer that George gives stems from imperfect competition. He states (Chapter 14) "That as land is necessary to the exertion of labour in the production of wealth, to command the land that is necessary to labour is to command all the fruits of labour save enough to enable labour to exist." and later "Material progress cannot rid us of our dependence upon land; it can but add to the power of producing wealth from land; and hence, when land is monopolized, it might go on to infinity without increasing wages or improving the condition of those who have but their labour" A caricature of George's argument is that labor is supplied competitively, earning its subsistence value, while land is monopolized and earns the entire remaining value of the fruits of production.

Piketty's core argument has a similar structure as that of George's (1879) core argument, substituting returns to capital for the rents earned from land. Piketty (2014) also provides some other scenarios under which returns to capital could exceed returns to labor, as well as a detailed look at the accounting of inequality and a number of perspectives on its incidence, dynamics, and implications for taxation.[15]

Over time one can see a progression in which forms of capital are most vital and monopolizable. As agriculture became a shrinking part of the economy more of the returns moved to the financial capital and control of means of industrial production (e.g, the oil and railroad barons of the nineteenth centuries). More recently, growth has moved increasingly to service industries, which rely less on financial capital but can still hold enormous economies of scope and scale.[16] For example, substantial growth in modern monopolies have come from social media, where the more users and content a given site has, the more attractive it becomes. The profits to such monopolies have been enormous and very concentrated. For instance, as Atkeson and Irie (2020) show, one can explain much of the large amount of wealth concentrated at the very top of the distribution, simply by accounting for families that make undiversified investments in businesses that happen to become very large and profitable.[17] Thus, some random chance, coupled with undiversified investments and extreme returns to some enterprises can also lead to a large concentration of wealth a the top of the distribution, without any special returns to capital on average. More generally, how the fruits of production are shared depend on property rights, regulation, and a variety of cultural norms (e.g., see Borgerhoff-Mulder et al. (2009); Bowles, Smith, and Borgerhoff-Mulder (Editors)).

Nonetheless, as Piketty (2014) acknowledges (see also Piketty (2015)), much of the recent growth in inequality is in income. This can partly be tied to increased returns to education. Thus, while excess returns to land, capital, and monopolies, can be important drivers of wealth inequality, they leave much unexplained about the large amount of income inequality that still exists when we completely ignore the wealthiest few percent of the population.

Let us next turn to some economic explanations for the sizeable inequality in employment and earnings that we see across the world and within many countries. This inequality is substantial even when we ignore the highly wealthy; and includes the gap between outcomes for those with post secondary education and those without. It is one that social factors have the most to say about.

[15]For a variety of comments and debate surrounding Piketty's argument, evidence, and conclusions see Krugman (2014); Mankiw (2015); Jones (2015); Acemoglu and Robinson (2015); Piketty (2015).

[16]There are also effects of globalization on inequality, as discussed, for instance by Krugman and Venables (1995).

[17]For more background on churn among the very wealthy, see Gomez (2021).

3.2 Frictions in Human Capital and Other Poverty Traps

The ratio of the wages of those having a college degree compared to just a high school degree or less has more than doubled in the last half-century.[18] Again, a short caricature is that technological advances are making high-skilled labor more productive, while those same advances are replacing low-skilled labor. That is, technology in the form of improved computing power, communication, and automation, have been complementary to high-skilled labor while substituting for low-skilled labor.

This is not just a modern phenomenon, but happened during the industrial revolution when agricultural labor was increasingly displaced and returns to skills in manufacturing grew. Again a century later when labor was displaced in manufacturing in many industrialized countries and shifted to services. The natural adjustment of this should be that more people invest in education that makes them best-suited for the new productive opportunities. In the current setting, this would drive up the supply of people with high levels of education and drive down the supply of relatively uneducated labor, bringing the wages back into balance (adjusting for costs of education).[19]

There are many frictions here. Some are geographic, as taking advantage of new opportunities can require uprooting which is both risky and costly – leading people with fewer resources to stay behind (e.g., see Connor and Storper (2020)). Some reflect the slow growth in availability of the supply of education needed. For instance, the access to higher-education has been slow and in fact stagnant in many countries.[20] Some reflect the barriers to the necessary investment among poor families, and other related inheritance issues (e.g., see Bowles and Gintis (2002); Sacerdote (2007); Benhabib, Bisin, and Zhu (2011); Fagereng, Mogstad, and Ronning (2018)). As education is cumulative, differences in parents resources', opportunity costs, and approaches to educating their children at early ages, as well as available public resources, can be constraining (e.g., Bowles (1972); Lareau (2011)).[21]

This can be seen as an example of a more general form of a poverty trap (e.g., see Carter and Barrett (2006)), where a lack of resources leads to under-investment and low returns,

[18] See the background and references in Jackson (2019). The wage gap is also mirrored by a growing longevity gap, as found by Case and Deaton (2021).

[19] See Tinbergen (1975) for a classic discussion of this, and Goldin and Katz (2009) for more detailed discussion of the relative rates of technological change and education advancements. See also the empirical analysis and theory of Kuznets (1955), who posited that growth and changes in production could lead to increased inequality as capitalists profit from expanding industries, while competitive wages and some moving frictions lead to falling wages in areas left behind and slow wage growth in the new industries. He also predicted an eventual decline in inequality once the period of change subsided. Evidence for this Kuznets curve is mixed (e.g., see Alfani (2021)).

[20] For example, see the statistics on investments in education and amount of higher education from the US National Center for Educational Statistics. In contrast, since the 1990s higher education has been growing rapidly in China - although still not at a fast enough rate to compensate for the rapidly increasing demand for qualified graduates.

[21] See also Durlauf (1996) who embeds such an education poverty trap within a model in which families choose neighborhoods in which to reside. Wealthier families choose to live in neighborhoods that are not affordable to poorer families, for the greater financing of education as well as the peer dependence on educational attainment.

which leads to a lack of resources. Effectively there are increasing returns to investment, and without minimal investment, one cannot get out of poverty. Such vicious cycles reflect difficulties in borrowing, especially given the lack of collateral and the moral hazard and adverse selection issues associated with such lending; not to mention the early ages at which such investments are often most effective (e.g., see Loury (1981)). There are related poverty traps in health, as poor nourishment and health leads to lower productivity and prolonged poverty, which then lead to lower nourishment and health. These sorts of poverty traps, and lack of adjustments to shifting technologies and economies, also have important social network/social capital aspects to them: as adjusting takes both the knowledge of how to adjust, as well as the opportunities to do so, as discussed more below.

3.3 Discrimination and Statistical Discrimination

Another long-standing source of inequality, and one that appears in many forms, is discrimination. An advantaged group favors its own members and discriminates against another group's members, such as according to ethnicity, social class, religion, gender, caste, language, and other characteristics. It has been wide-ranging across millennia and cultures, and has manifested itself in the forms of slavery, caste systems, klan systems, racism, segregation, sexism, stereotyping, and in the many ways in which some groups are favored in access to education, jobs, and political positions. There is extensive evidence of discrimination showing that not only is it widespread, but also that its impact can be large.[22]

Researchers have distinguished between two forms of discrimination: one is a direct "taste-based" or culturally driven discrimination in its many sociological forms (Becker, 1957; Pager and Shepherd, 2008), and the other is often referred to as "statistical discrimination" (Arrow, 1971; Phelps, 1972). Under statistical discrimination, people expect some group to have lower human capital and productivity, and this makes it more difficult for that group to get good employment. Given the worse employment a group expects even if it invests in human capital, it then has less of an incentive to invest in becoming productive; and so the group ends up being less productive which confirms the expectation.[23] Statistical discrimination can be seen as another form of poverty trap, and a particularly pernicious one, since the group that is being discriminated against cannot escape even if they are given the resources to invest in developing their human capital, as they are still stereotyped as being less productive.

[22] E.g., see Newman (1978); Fix, Galster, and Struyk (1993); Fershtman and Gneezy (2001); Bertrand and Duflo (2017); Hangartner, Kopp, and Siegenthaler (2021).

[23] For more background and more discussion of the distinctions between these two forms of discrimination, and what evidence there is for each, see Arrow (1998); Lang and Lehmann (2012); Bohren, Haggag, Imas, and Pope (2019).

4 Social Drivers

As mentioned above, inequality has been a central topic of the sociology literature including major theories of social stratification and class distinctions, discrimination, and collectivism, among others. Rather than attempt to survey that enormous literature, I take a narrow focus that is more micro-oriented and operational, and examines the interplay between social networks and economic behaviors. Some of the divides in networks that play the starring role below are driven by basic sociological forces, and thus much of the policy discussion below still directly, or indirectly, addresses the larger set of social forces driving inequality.

I focus on three main ways that people's friends and acquaintances impact their behaviors and outcomes, and result in inequality and immobility. I take each in turn.

4.1 Unequal Job Opportunities via Social Connections

The pervasive use of referrals and connections in obtaining jobs has been extensively documented.[24] The data from such studies show that connections are a primary channel through which people obtain jobs across almost all professions and education levels, and across countries and cultures.

There are several reasons for which jobs are often filled via connections rather than open applications or other means. One is that there is a lot of uncertainty about how an applicant will actually perform in a new job. Are they sufficiently skilled? Will they work well with others? Will they be responsible and productive? Will they stay for a long time? Interviews and resumés provide very imperfect answers to these questions. References and referrals provide much more insight into these questions (e.g., see Bewley (1999)). Most importantly, current employees and people well-connected to a company know what a particular job entails, and they are best-suited to find good matches for an open job. For example, many applicants may have some background in coding a certain software and be literate enough to pass an interview, but the applicant might still not have the skill to perform a project that the employer has in mind. This is something that someone who is involved in the project or knows it well and has either worked with this person, or overseen that person, would know. Thus, the personal connection becomes very useful. Indeed, there is ample evidence that people hired via referrals are more productive, creative, and stay longer in their positions than people hired via without referrals.[25]

A second reason for using referrals is that employers often wish to find people similar to the best of their current employees (e.g, see Fernandez, Castilla, and Moore (2000)). These employees have the right background for the position, and fit well with the time demands, and

[24] E.g., see Myers and Shultz (1951); Rees (1966); Rees, Shultz et al. (1970); Granovetter (1973); Montgomery (1991); Granovetter (1995); Ioannides and Datcher-Loury (2004); Topa (2011); Rubineau and Fernandez (2013); Zeltzer (2020).

[25] E.g., see Fernandez, Castilla, and Moore (2000); Brown, Setren, and Topa (2012); Fernandez and Galperin (2014); Burks, Cowgill, Hoffman, and Housman (2015); Dustmann, Glitz, Schönberg, and Brücker (2016); Pallais and Sands (2016); Bond and Fernandez (2019); Benson, Board, and Meyer-ter Vehn (2019).

have not quit. It can be hard to find similar people from looking at applications, whereas by using the social network an employer can actually take advantage of homophily. The demands of the job might not have anything to do with skill levels, but more basic things like not stealing from the company, being willing to work long hours, or travel extensively, or work strange shifts, or be available for extra work at short notice, etc. By hiring via the network they are more likely to hire someone who is very similar to their current employees who have these characteristics. This might not diversify their workforce, but often an employer's priority is finding someone who can do the job and will not quit too soon.

A third reason is that friendships with other workers can directly affect the performance of employees as well as their turnover – having friends within an organization can lead a person to perform better and stay longer (e.g., Fernandez, Castilla, and Moore (2000); Fiorillo and Nappo (2014); Brown, Setren, and Topa (2012)). On the flip side of this are forms of nepotism and favoritism, which can have negative effects Ponzo and Scoppa (2010), but those depend on the level of homophily Horváth (2014).

Regardless of the reason, when coupled with homophily, the reliance of referrals leads to feedback effects and can be a basic force behind inequality in both employment and wages. If one group has higher employment than another group, in some industry or just in general, then due to homophily the first group's members can expect to receive more referrals than the other group's members, on average. Getting more referrals leads to a higher chance of being employed, as well as being matched most productively. The intuition behind this is straightforward: taking the best option out of a set gets better when that set is larger. Having more options also improves a person's bargaining power leading to higher expected wages and promotions. For instance, as discussed by Arrow and Borzekowski (2004), relatively small differences in the number of referrals different groups have access to can explain a substantial amount of the differences in wages by race.[26]

Referrals via people's networks also up correlating the employment and wages among friends, as analyzed by Calvo-Armengol and Jackson (2004, 2007). Having more employed friends leads a person to have a greater chance of getting referrals, and multiple referrals.[27] There is substantial (causal) evidence for this correlating effect of referrals in a variety of settings.[28]

Moreover, since higher current employment of the members of some group leads to higher employment for that group's next generation this also correlates employment and wages

[26]People's positions in their networks affects their bargaining power more generally, and can lead to quite unequal outcomes when there are strong asymmetries in position, as discussed by Kets, Iyengar, Sethi, and Bowles (2011).

[27]Employment over time can also affect the accumulation of friendships, which can also have a further feedback effect (e.g., Avin et al. (2015)).

[28]E.g., see Sacerdote (2001); Munshi (2003); Beaman (2012); Patacchini and Zenou (2012); Laschever (2013); Clauset, Arbesman, and Larremore (2015); Beaman, Keleher, and Magruder (2018); Lalanne and Seabright (2016). The wage effects are more subtle than employment effects, and may depend on details of the setting and the numbers of connections. For instance, the analysis of Arrow and Borzekowski (2004) suggests that wages are concave in the number of connections, which is seen empirically by Berardi, Lalanne, and Seabright (2019).

across generations, as for instance, analyzed by Calvo-Armengol and Jackson (2009); Bolte, Immorlica, and Jackson (2020). Thus, the combination of homophily and heavy use of referrals in employment can lead to immobility and provides an understanding for the strong relationship between inequality and immobility.

In addition, the resulting inequality and immobility also have productivity implications. The fact that people with poor connections have fewer chances to find jobs, and those with more connections can get multiple offers, means that the chances for people to be matched to an employer is unevenly spread around the population (Bolte, Immorlica, and Jackson (2020)). In general, if the value of an additional referral to a person in terms of matching that person to the most productive employment is diminishing in the number of referrals that the person already has, then maximizing a society's productivity involves spreading the referrals as evenly as possible throughout the population. Instead, homophily leads referrals to be unevenly spread, and more heavily concentrated among groups that are already well-employed. Moreover, this can even further concentrate the referrals, as they end up passed along to the relatively few unemployed among the advantaged group rather than to the relatively larger group of unemployed among the disadvantaged group. Thus, the combination of homophily and referrals not only has inequality and immobility implications, but also average and total productivity implications. Spreading referrals more evenly throughout a population increases both the average level of productivity of those who are employed, and can increase the total amount of employment in the economy.

The combination of homophily and referrals can also distort investment incentives and result in a form of poverty trap. For instance, a person who has, or expects to have, few employed friends has a low incentive to invest in acquiring skills to take advantage of employment opportunities.[29] This is not only a question of being employed or not, but extends to many forms of investments in skills. For instance, someone who never expects to rise to a management position has a low incentive to invest in acquiring the skills to become a manager. This can also affect the expectations of employers, who then do not expect members of some groups to have the backgrounds needed for some positions – which can then also play back into a form statistical discrimination.

4.2 Unequal Access to Valuable Information

Job opportunities are just one form of information that flows through networks. People also learn about many other things from friends, acquaintances, and various media. This affects a broad set of behaviors, including everything from adoption of a fertilizer or new crop (e.g., Conley and Udry (2010); Bandiera and Rasul (2006)), to participation in a microfinance program (e.g., Banerjee, Chandrasekhar, Duflo, and Jackson (2013)), a vaccination program (e.g., Banerjee, Chandrasekhar, Duflo, and Jackson (2019)), a tax-deferred retirement program (e.g., Duflo and Saez (2003)), to teen pregnancy Kearney and Levine (2015)

[29] E.g., see Calvo-Armengol and Jackson (2004); Jackson (2007); Bowles, Loury, and Sethi (2014); Bolte, Immorlica, and Jackson (2020).

and education decisions (e.g., Sacerdote (2011)). Having networks that provide good information can be extremely important in determining people's lifetime health and well-being trajectories and outcomes (e.g., Loury (1977); Bourdieu (1986); Loury (2009)).

One might imagine that technological advances might overcome this. However, the information that people have and the opinions they form are heavily dependent upon their social networks, even in a social media-rich world. A powerful example of this comes from Bakshy, Messing, and Adamic (2015) which shows that exposure of people to cross-cutting political content is lowered not only by the homophily in their networks, but then also by what is fed to them via a platform, and additionally by they pay attention to. When put together, in their data only about a quarter of the content that people end up viewing is cross-cutting. That study examines news content, which can be shared broadly. Information concerning investing in education, pursuing a career, and other large life-investments, is often complex and nuanced, and learned from friends over long periods of time. Given the strong levels of homophily among friends, this can lead to even more inequality in access to information about such important investments.

The role of homophily is nuanced. As Aybas and Jackson (2021) show, homophily is a double-edged sword in social learning settings. For instance, as discussed above, a person can learn more from people who are similar to themselves. A student who is from a low income family and has limited preparation for university learns more about what attending university requires from others who have similar backgrounds, than from someone from a wealthier background in a special preparatory school. On the other hand, given that far more people from wealthier backgrounds attend university (Chetty, Friedman, Saez, Turner, and Yagan, 2020), homophily can also disadvantage poorer people in terms of the number of people whom they know with any university experience. Which of the two effects dominates depends on the circumstances. Ultimately having both is optimal: having access to high quality information from closely matching peers, but across a variety of options provides the best basis for decision making. This is the foundation behind some mentorship programs, in which people are connected to others well outside of their own friendship circle and who can provide valuable advice, but also whom the mentees can understand.

Importantly, homophily means that information about key opportunities and decisions can be distributed unequally across a population. Without awareness of the availability of various choices and the costs and benefits of those choices, and enough information to be confident in a decision, people miss out on valuable opportunities. For instance, if more people of one ethnic or social group participate in higher education at a greater rate, then friends and families of those people gain more information about that experience and its benefits. This then feeds back to lead relatively next generations of the group with more experience to invest at greater rates, and the other group to continue to under-invest (Aybas and Jackson, 2021).[30] Again, this suggests that divisions in the network not only lead to

[30]It is worth emphasizing that informational disadvantages can be particularly problematic for the very poor. For them, uncertain outcomes – even with high expected values – can be too risky to take advantage of since the costs of failure can be relatively enormous (e.g., Banerjee and Duflo (2011)).

inequality within a generation, but transmission of that across generations.

This is born out in strong empirical evidence that networks of connections across economic boundaries predict economic mobility. For instance, we find in Chetty et al. (2021) that the economic mobility of low socio-economic status people in a given community is strongly predicted by the extent to which low socio-economic status people are connected to high socio-economic status people. This is what the theory would predict, given that information and opportunities are more often in the hands of the high ses people, and so greater access to those people provides increased chances of having better economic outcomes. In fact, the extent of these cross-income connections within a community (strongly) out-predicts other standard community measures of poverty, segregation, social capital, and human capital, when it comes to explaining economic mobility.[31] Interestingly, we also find evidence that these cross-income connections are at the heart of the Great Gatsby Curve. In particular, once we control for a community's cross-income connections, the relationship between inequality and immobility completely disappears (again, see Chetty et al. (2021) for details).

Different types of social capital can have different effects on learning and behavior. Having a tightly-knit community on a local level can help that community function in providing incentives for people to cooperate and share with each other.[32] However, that local support and clustering can be insufficient to help in economic mobility, as a very cooperative and supportive group can still be missing vital information and opportunities that it needs to succeed. Gaining that information and those opportunities can require cross-cutting relationships, which is a very different form of social capital, and social network feature, which is what we see in the data in Chetty et al. (2021). In fact, there support within the community turns out to more advantageous in settings in which there is integration across socio-economic lines, so the two appear to have some complementarity. More generally, the connectedness of people to information also depends on the quality of the local institutions that they are a part of, such as child-care centers, and the outside resources and connections that such institutions offer and which vary widely across geography (e.g., see Small (2006)). Thus, one can think of economic connectedness as a feature not only directly of individual networks, but also of the networks of institutions through which people interact.

It is also worthwhile distinguishing two types of consequences of homophily and learning in networks. One we can call passive. This refers to the fact that homophily can lead different groups hold different beliefs over time, and to be slow or never converge to a consensus (Golub and Jackson, 2012; Lobel and Sadler, 2016). The other we can call active. This refers to the feedback effects in actual decisions, as for instance outlined by Aybas and Jackson (2021). The fact that a group does not take advantage of some opportunity leads that group to learn less about that action and then be less likely to take that decision in the future. Given that many decisions and opportunities carry economic benefits, those can be

[31] For additional evidence on how the geography of people's networks impacts many behaviors see Bailey, Cao, Kuchler, Stroebel, and Wong (2018).

[32] See, for instance, Coleman (1988) and Jackson, Rodriguez-Barraquer, and Tan (2012).

unevenly distributed across the population, leading to inequality and immobility patterns that match the homophily. And, in parallel to the job contact situation, many behaviors can be suboptimal. People miss out on valuable decisions – such as educating themselves – that have consequences not only for themselves but also for the overall productivity of the society.

Note that many different forces can all operate at once. Having a productive life requires the proper training and development, the information of how to put that to its best use, and the opportunities to use it. Economic and social hurdles hinder education and development, homophily limits the extent to which information reaches a group and to which that group tries certain options, and then homophily and the roles of networks in referrals and advancement hinder employment and advancement even conditional upon having the right skills and match for a job. All of these complement each other, and that complementarity has implications for how combinations of policies can be more effective than policies in isolation, as discussed more below.

4.3 Norms, Culture, and Peer Influence

The clustering of behaviors can occur for reasons beyond information sharing. For instance, children imitate siblings and peers, people adopt fashions and fads, people prefer to see movies and read books that they can talk to their peers about. The many pressures that push people to similar behaviors, can shape very consequential decisions including pursuing education (e.g., see Austen-Smith and Fryer (2005)).

Once again, homophily plays a starring role, as splits in the network can lead to different norms of behavior across homophily divides (e.g., see Jackson (2007); Jackson and Storms (2018)). As a simplest example, imagine that people choose to dropout of school if a majority of their friends do, but not if a majority of their friends stay in school. So, they simply prefer to do the same thing as the majority of their friends - the simplest version of a game on a network (see Jackson and Zenou (2014) for background). In many networks it is easy to find (many) splits of the network into two groups such that each member of a group has a majority of their friends within that same group. Then it is an equilibrium for everyone in one group to stay in school and everyone in the other group to drop out.

This is a stylized example, but the phenomenon is clear: homophily leads to strong divisions across a network so that different groups have most of their connections within that same group. This can lead groups to have different norms of behavior and cultures, even when they might be in close proximity to each other, and even have social connections with each other. For instance, the friendships in many schools splits along ethnic lines, and that can very different behaviors across groups even within the same school. These effects can be amplified by the fact that people can misperceive behaviors in the own social circles to be more representative of norms overall than they really are (Jackson (2019,b); Bursztyn, González, and Yanagizawa-Drott (2020); Frick, Iijima, and Ishii (2020)).

It is also important to remark that peer effects are not only just passive, but sometimes

can be active. That is, people may deliberate push their friends to act in certain ways: students may bully students who do not conform to a group norm (Austen-Smith and Fryer, 2005), or people may pressure others until they behave in certain ways (e.g., see Calvó-Armengol and Jackson (2010)), or try to lead by example in hopes of getting others to act (e.g., see Acemoglu and Jackson (2014); Jimenez-Gomez (2021)). This can lead behaviors to become even more governed by network divides.

Note that many behaviors that are influenced by networks are cumulative. Things such as education, health, and aspirations can have cumulative effects, so that as deficiencies become entrenched over time it becomes harder to eliminate them. Moreover, the peer effects and lack of information that can lead to poor study habits, health habits, and low aspirations, feedback through the network both within and across generations to amplify these deficiencies.

5 Policies to Overcome Inequality

The variety of factors that can lead to inequality in outcomes suggest a corresponding variety of policies to deal with that inequality. The policies to overcome the wealth concentrated in the hands of the top percentiles of the population are different from those needed to deal with widespread and persistent differences in health, education, employment, and income by ethnicity, caste, and gender that exist in many countries. Let us consider the logic behind various policies.

5.1 Redistribution: Addressing Symptoms or Causes?

A policy that is often associated with combatting inequality is redistribution. This comes in many forms: progressive taxes, subsidies, universal basic income, price and wage controls, as well as government-run retirement, health, and welfare programs. Effectively, these are all programs that re-allocate resources across the population. Such programs reduce inequality to the extent that net benefits are seen by poorer individuals and net costs are seen by wealthier or higher income individuals.

It is important to distinguish two different reasons for redistribution.

The first comes from Rawls' veil of ignorance, which justifies redistribution as a form of social insurance. By reallocating resources from those in better circumstances to those in worse circumstances, a society is essentially offering a form of insurance when viewed from behind the veil of ignorance. The question of how much redistribution there should be, and who should benefit and who should pay the costs, is something that elicits a variety of views. What is viewed as optimal traces back to the moral foundations of society's responsibilities to its individuals versus their responsibilities to themselves. This is well illustrated in Sen's (1992b) discussion of the "equality of what?"[33]

[33]Beyond the moral issues, there are also a variety of incentive issues as such programs can distort people's

The second justification for redistribution is to combat poverty traps. For example, if people cannot afford education, and cannot borrow privately to pay for it,[34] then having a government provide it and/or help pay for it can overcome the market imperfection. The same is true of other forms of government sponsored loans and programs that spur investments in human capital and health.

This is an important distinction, since social insurance is essentially an ex post remedy to deal with the symptoms of inequality. Instead, a justification based on overcoming market imperfections in which people are trapped in poverty is aimed at overcoming root causes. Policies aimed at the root causes also deal more directly with immobility and inefficiencies in production.

Both justifications are important. In treating a disease, one treats symptoms as well as root causes – treating inequality is similar. Nonetheless, the distinction is vital, since much attention is focused on remedies for the symptoms and some of those will not eliminate the causes of inequality or its longer-run effects like immobility, but instead will only overcome some of its immediate negative impact. Some taxes, especially those aimed at wealth and inheritance, fall into both categories, as do regulations that combat monopolies and other forms of market driven inequality, as they not only redistribute but also undo some of the sources of inequality (e.g., for a discussion of some of the impacts, see Chetty (2009); Dworczak, Kominers, and Akbarpour (2019)).

Policies can also be distinguished in terms of how leveraged they are. For instance, it is clear that investments in early education – even at preschool levels – have large snowball effects.[35] It is worth noting that many aspects of children's education are determined by parents (e.g., see Lareau (2002); Becker (2009); Lareau (2011)), and thus educating parents about how to parent that can be an important part of an effective policy. Evidence for this point dates at least to some of the findings from the original Coleman Report ("Equality of Educational Opportunity," 1966) regarding the importance of various peer effects, local culture, and community factors, and has been studied in detail (e.g., see Small, Harding, and Lamont (2010); Gelber and Isen (2013); Almond, Currie, and Duque (2018); Agostinelli et al. (2020)). Moreover, peer effects among parents mean that there network effects that should be addressed and leveraged by such policies.

behaviors. For instance, for an illuminating discussion of the incentive issues associated with equal sharing of resources, see Abramitzky (2011, 2018).

[34]There are many impediments to borrowing based on uncertain future values in the absence of having collateral to post, including moral hazard and adverse selection issues, as well as the fixed costs of administering relatively small or highly idiosyncratic loans.

[35]E.g., see Currie (2001); Garces, Thomas, and Currie (2002); Heckman, Moon, Pinto, Savelyev, and Yavitz (2010); Huggett, Ventura, and Yaron (2011); Heckman (2012); Aizer and Cunha (2012); Heckman and Mosso (2014); Felfe and Lalive (2018); Bailey, Timpe, and Sun (2020); Carneiro, Garcia, Salvanes, and Tominey (2021).

5.2 Addressing the Root Social Causes of Inequality: Leveraging Network Effects and Overcoming Homophily

Understanding how homophily affects opportunities, information, and behaviors, provides specific insights into constructing policies to overcome the resulting inequality, immobility, and production inefficiencies.

There are two different approaches that can each be effective in its own way. One is to change the networks to try to lessen homophily and eliminate some of its perverse effects. The other is to overcome the effects of homophily by providing opportunities, information, and changing damaging norms of behavior. Any form of policy can have unintended consequences, and social engineering can be especially dangerous, so it is important to consider how each of these works, and how the costs and benefits of each type of program work.

5.2.1 Network Effects and Social Multipliers

One aspect of networks that it is especially useful in policy design is that they are full of externalities and involve feedback and cascading effects. On the negative side, these are at the heart of the causes of inequality and immobility, but these effects also work in reverse can make well-designed policies much more effective.

To illustrate the point, consider a policy of affirmative action in overcoming unequal access to job opportunities. As discussed by Bolte, Immorlica, and Jackson (2020), the placement of people into jobs not only benefits those people directly, but also helps their networks of friends (and their friends, ...). They can then offer referrals to others, as well as information that can help their communities better prepare for particular careers. Thus, such a program should not be evaluated just on its direct effects on the individuals involved, but what it means for others within their communities. Role model effects are often mentioned in such a context, but there are more basic network effects that the individuals involved can provide access and information to their friends, family, and acquaintances, well beyond simply showing that it can be done. Moreover, because networks of relationships expand outwards exponentially, these effects can be substantial. It also means that a temporary program can have long-lasting impact: giving one person a job that they would not have otherwise had can lead them to help others, who can then help others, etc.[36]

This perspective does two things. First it means that one should evaluate network-designed programs based on their full impact. Second, it means that one should take advantage of network structure in optimally targeting a policy.

To see this second point, consider a network policy in the presence of peer effects. The causal evidence for such peer effects is now quite extensive over many domains including, for instance, exercise (e.g., Aral and Nicolaides (2017)), vaccination decisions (e.g., Banerjee

[36]Such social multiplier effects are not just present in job markets, but in many other contexts too, such as crime Glaeser, Sacerdote, and Scheinkman (2003), tax evasion (e.g., Galbiati and Zanella (2012)), and smoking (e.g., Cutler and Glaeser (2010)), to name a few.

et al. (2021)), voting (e.g., DellaVigna et al. (2016)), and education (e.g., Sacerdote (2001)). To understand how network structure matters in the presence of such peer effects, consider a specific application of students in high school and their decisions ow whether to continue to post-secondary education. They can pay attention to their peers for many reasons. One is that they simply enjoy behaving similarly, as that provides more commonality in experience and makes them feel as if they belong, and it can also be that they learn from their peers, or that they see more benefits from continuing education as more friends do (e.g., from future job market contacts, etc.).

To make things concrete, suppose that students prefer to choose the same behavior as the majority of their friends. Consider some community in which students all choose to stop – essentially, stuck in a bad equilibrium. If we have a limited number of scholarships (or other types of help) to give out to encourage students to continue their educations, it makes a big difference as to how we place these within the network. If the scholarships are randomly strewn around the network, it can be that we only get the direct effect. Those students go on to secondary education, but none of the other students have a majority of their friends continuing their education. If instead, we carefully seed the scholarships within cliques and subgroups - so that they are concentrated and near each other, then they can lead other students to have a majority of their friends continuing. This then leads those friends to continue, and this can cascade outwards.[37] Indeed, as Jackson and Storms (2018) show, the benefits to careful targeting such seeds in the presence of peer effects can lead to arbitrarily large advantages compared to random placement.

This is reflective of differences between the diffusion of basic awareness compared to norms and complex behaviors (e.g., see Golub and Jackson (2012); Centola (2018); Jackson and Storms (2018)). To be aware of a program subsidizing education might only require hearing from one friend, but to know how to take advantage of that program and actually participate in it might take observing several friends go through it. Thus, in terms of how one injects information and opportunities into a network to overcome inequality is not only governed by the shape of the network, but also by how different sorts of behaviors and outcomes are shaped by the network.

5.2.2 Changing Networks and the Challenges of Social Engineering

Let us now return to discuss the two approaches to overcoming the effects of homophily, beginning with shaping networks.

The impact of changing a person's network can be substantial. Some of the most eye-opening evidence of this comes from the impact of the "Moving to Opportunity" program, in which some families were subsidized to move from poor neighborhoods into wealthier ones. As shown by Chetty, Hendren, and Katz (2016) the long-term effects can be enormous, especially when children are moved at an early age. There were sizeable effects on health,

[37] See Calvo-Armengol and Jackson (2004); Jackson (2007, 2019) for more examples and discussion of this point.

education, and long term income, and they estimate, for instance, that an eight-year-old child who moved saw an average lifetime earnings increase 302000$.[38] An interesting aspect of this effect is that it decreased with the age of the child. Older children are more embedded in networks and behaviors, and both are both harder to change when they have accumulated to a greater extent.

The formation of networks of friendships and other relationships are heavily driven by who a person is in contact with (Blau (1977); Blau and Schwartz (1984); Blau (1987)). As Peter Blau put it, "One cannot marry an Eskimo, if no Eskimo is around." If people have substantial contact with others who have access to opportunities and information, then they can take advantage of those connections. By moving a child out of a poor neighborhood and into a wealthy one, all of the things we have been talking about are changed: information flows, opportunities, and norms of expected behaviors.

Although experimental programs like Moving to Opportunity show what is possible, shifting whole populations of people around is not practical. Moreover, it might not even have the desired effect. Moving a few families into different neighborhoods and seeing them integrate is very different from making large-scale changes. In particular, just putting people in contact does not necessarily alter their networks, unless they are a small minority who have little choice but to integrate. One group having contact with another is necessary for forming cross-group connections, but can be far from sufficient. For example, as found by Currarini, Jackson, and Pin (2009, 2010),Chetty et al. (2021); Mosleh et al. (2021) both contact and other details including choices matter to a sizeable degree in friendship formation. In fact, some of the largest and most racially-balanced high schools in the US are some of the most fragmented along ethnic lines (Currarini, Jackson, and Pin (2009, 2010)), while smaller high schools were more integrated.

An example of how a policy designed to help individuals by engineering their communities can lead to unintended consequences comes from Carrell, Sacerdote, and West (2013). Entering cadet classes in the US Air Force Academy were carefully structured to match together students who had the lowest predicted grade point averages with students who were expected to perform well. Prior data had shown that cadets with low-predicted achievement performed above predicted levels when they had greater exposure to higher-ranked peers. What was unexpected is that when the experiment built whole classes of roughly half very low-predicted achievement and half high-scoring cadets, then the cadets would self segregate. Just as discussed above, when groups have larger critical masses, the friendships are more likely to splinter. The idea behind this effect is intuitive. In small communities, people have relatively little choice over whom they are friends with – groups are forced together. When communities become larger, each group reaches a critical mass so that people can sustain a natural number of friendships just within their own community. People's proclivity towards homophily can take over and people have plenty of other people who are very similar to

[38]For another important example of this sort of effect, see the analysis in Abramitzky, Boustan, Jácome, and Pérez (2019) regarding the importance of location in the mobility of immigrants.

themselves with whom to be friends. What happened in the Air Force Academy experiment was that instead of having small numbers of low-predicted achievement cadets integrating with high-scoring cadets, they provided the low-predicted achievement students with many more opportunities to form friendships among themselves, leading to more segregation and worse outcomes.

Thus, although reshaping networks can be incredibly powerful at lifting people out of poverty, these sorts of nuances mean that social engineering is tricky and can have substantial unintended consequences. Nonetheless, research to date suggests several insights that can be helpful in shaping successful policies.

One is this fact that smaller groups foster more integration than larger groups. It suggests a new approach to lowering homophily can be to improve the structuring of large organizations and communities by reshaping them into relatively small and well-mixed subcommunities. Many aspects of urban planning as well as the structuring of universities, companies, and other large institutions, are aimed at trying to create smaller communities within them. This suggests that not only can this be done to create tight community structures within larger organizations, but also to help build bridges across different demographic and socio-economic groupings. If a high school has huge numbers of students, then putting them into smaller groups who take many of their basic classes together, and take meals together, etc., is like putting them in a smaller school where we know that more cross-group connections tend to be built.[39]

Second, the network effects that we mentioned above mean that providing new opportunities to diversify connections across a network has a sizeable impact. In line with this prediction, our analysis in Chetty et al. (2021) finds a strong relationship between economic mobility and increasing connectedness.[40] The roughly linear relationship that appears in the data may reflect that each marginal bit of connection conveys similar benefits, or it may be that there are underlying threshold effects that are smoothed out when averaged across a community. Further exploration of economic connectedness may help uncover which aspects of the connectedness – information, opportunities, or peer effects – are empirically most relevant. Regardless, it is clear that cross-income connections hold promise as a key to improving economic mobility.

Third, simply increasing exposure can also affect discrimination and racism (Allport, 1954), and recent studies show that contact can causally impact people's views and longer-

[39]This also can tell us why some of the initiatives in the U.S. in the late 1950s through the end of the last century to build large schools that were well-integrated, via busing and redistricting, failed to lead to well integrated friendships and interactions, and the desired improvements in achievement. Without structuring the internal workings of the schools to foster tight small-group interactions, students could self-segregate within their new schools just as they were segregated across their old ones. The Air Force Academy experiment is a warning, however, that creating small groups that are too bimodal can still lead to segregation, even in relatively small cohorts.

[40]To put the slope in perspective, changing from the 10th to 90th percentile in economic connectedness predicts a 10 percentile increase in the income rank at age 35 of children from low-income families (which is comparable to the estimated gap in upward mobility between Black and White Americans).

term prejudice and behaviors Strother et al. (2021); Bursztyn et al. (2021). This can be true independently of the resulting friendship networks. Moreover, contact can result in nonsocial and weak ties that are useful conduits of information and opportunities even if they do not become strong relationships (e.g, see Small (2009)).

Fourth, there are benefits from homophily that can be undone if people's networks are disrupted, and so it can be better to supplement rather than to dramatically rewire existing relationships. Tearing communities apart, without ensuring that new ones provide all the support that people need can have damaging consequences (e.g., Barnhardt, Field, and Pande (2016)).

Fifth, as technology becomes increasingly instrumental in shaping people's networks and their information, the design of the algorithms that steer networks, exposure and information is becoming increasingly important. Competition between platforms and profit motivations can lead platforms to steer people towards connections and content that most closely mirror their backgrounds. Even though such algorithms can enlarge the size of people's networks, it can also end up increasing homophily rather than decreasing it. Seemingly small design choices behind the algorithms that people use for communication, connection, and search, can have profound consequences. Moreover, the incentives of the designers are not necessarily aligned with greater social good, especially given the large network externalities at work. Better understanding the workings and impact of these services, as well as the incentives of the designers, is an important input into future policy design.

5.2.3 Overcoming Network Structure

Next, let us consider overcoming the effects of homophily and network structure without altering the networks, but instead by counteracting their effects.

Some of the policies that help overcome the effects of networks are naturally suggested by the limitations that homophily imposes. In particular, to overcome the lack of information and opportunities that people have due to not being well-connected, one can directly provide the missing information and opportunities. This provides a logic for mentorships, role models, and affirmative action policies. As mentioned above, the network effects lead the information and opportunities to diffuse more widely and thus can result in far reaching and long lasting effects (Holzer and Neumark (2000); Miller (2017); Bolte, Immorlica, and Jackson (2020)).

The informational barriers in job markets can also be overcome by helping organizations find good matches without having to rely on referrals. This can come in various forms. One is subsidizing internships for relatively disadvantaged groups, so that firms get to know the workers. Another is to provide better information about people's skills, by programs that allow them to show that they have reached certain skill levels. In this direction, there is some hope that the proliferation of online education and certification will help close some gaps. A less obvious factor in overcoming informational barriers is labor market rigidity. If it is very hard to fire a worker, then the initial hiring decision becomes even more important

and referrals become even more valuable. This can lead to increased inequality. Thus, regulations that are intended to provide job security can actually have a side effect of increasing inequality (e.g., see the analysis in Bolte, Immorlica, and Jackson (2020)).

Some policies, such as mentorships and affirmative action, can end up counteracting all three of the negative effects of homophily that we discussed above. Not only can these policies end up helping information and opportunities diffuse through the network, but also, as people from given group end up having successful careers, they also serve a prominent examples for their communities and can help reshape the norms, expectations, and culture within the community (e.g., Acemoglu and Jackson (2014)). These effects can also have increasing returns, at least initially. That is, each additional success can make the possibilities more visible and change people's expectations and aspirations even more, which also have further peer effects.[41]

5.3 Policy Cocktails

As argued by Alfani (2021), "human agency" – the implementation of deliberate policies to overcome inequality – is a main predictor of the trends of inequality over time; and when economies are left to operate unbridled, resources tend to accumulate highly unequally.[42]

As we have discussed here, there are many forces behind such inequality and immobility, both economic and social, which suggest that a coordinated policy cocktail will be much more effective than any policy in isolation. Moreover, some policies deal with symptoms while others deal with root causes, of which there are many, and all need to be treated.

A policy cocktail to fully address inequality requires at least four ingredients. First up are the basic safety net policies and redistribution that provide social insurance and address the symptoms, or in an analogy to the treatment of a disease, overcome the pain. Second are the long-standing economic policies that address the large wealth imbalances that accumulate from monopoly rents and increasing returns to various forms of capital. These include targeted regulation and taxation to address these issues without damaging economic incentives.[43] Third are subsidies to overcome basic financial poverty traps, including various loans, scholarships, subsidized day care and early childhood education, among others. Fourth are policies aimed at overcoming homophily and entrenched social networks. These include

[41] Again, this is a place where age can make a difference, and earlier interventions can be even more effective, and role models can have a wide impact on education attainment and trajectories (e.g., Beaman, Duflo, Pande, and Topalova (2012)).

[42] See also, for instance, Hubmer, Krusell, and Smith Jr (2020) who find that changes in tax progressivity explain rises in wealth inequality.

[43] There is large literature on the structuring of various programs, and how that can affect incentives as well as how easy it is for people to access a program (e.g., Mirrlees (1971); Katz and Meyer (1990); Krueger and Meyer (2002); Currie (2006); Chetty (2008)). I don't address those issues here, but instead focus on the interaction of social and economic factors and the basic insights on policy that are generated from that perspective. This interaction raises its own set of questions of policy side effects, such as how they change social structure, that are also beyond the scope here (e.g., Banerjee et al. (2020)) but are important for future research.

enriching people's networks through enabling more contact across groups and restructuring organizations; as well providing people with the information, opportunities, and role models that they are missing in their existing networks – via affirmative action, mentorships, internships, and certification programs. Importantly, network feedbacks and multiplier effects not only lead to large and persistent differences in behaviors and opportunities across groups, but also help leverage well-designed and appropriately concentrated policies to be more effective in overcoming inequality and immobility.

Most all of the necessary policies have been used in various forms before.[44] The most novel policy discussed here is the use of small groupings inside larger organizations and institutions to foster more cross-group exposure and interaction. The idea of fostering teamwork and community bonds are part of many organizations, but this instead leverages what we have seen in our network analysis to use small communities and teams build fruitful bridges across informational and opportunity barriers.

Importantly, a policy cocktail not only addresses different drivers and symptoms of inequality, but it can also be designed to take advantage of complementarities between policies. For example, enriching people's networks and information can have a greater effect if they have stronger bases from early-childhood education and help in overcoming the investments and opportunity costs needed for higher education. Conversely, offering subsidized loans for education to a disadvantaged group has a greater impact if they have good information about how to best make use of such resources in furthering their education, and also if opportunities to become employed are eventually available. Offering loans without information and opportunities will not have much impact, and similarly improving information without the resources and eventual opportunities will not work, nor would making opportunities available to a population that does not the resources and information to take advantage of them. All three of these policies are enhanced by the presence of the others. This is a "weakest-link" challenge, where outcomes only change if a number of conditions are met and a failure of any of those conditions leads to an overall failure. Policies that attack one condition at a time will be much less effective than ones that ensure that all conditions are met at the same time. Economic policies that are designed to attack poverty traps by making investments possible can be more effective when coupled with policies that overcome the informational, opportunity, and behavioral barriers imposed by the social networks; and vice versa. Further complementarities come from the fact that improvements in the outcomes for a member of some disadvantaged group puts them in a better position to then offer information, opportunities, and serve as a role model for others within that group. This is part of the network externalities. Combining policies like affirmative action together with mentorships, gives an extra boost to the power of the each, by both improving the situation of some people in the network and then enhancing the communication through the network.[45] More generally,

[44]However, many policies – such as affirmative action – have been used at a small scale relative to what would be needed, for instance, to balance the demographics of those attending higher education with those of the general population (e.g., see Chetty, Friedman, Saez, Turner, and Yagan (2020)).

[45]Some policies are less costly and scale more easily, which is also an important consideration. The point

any policy that improves a person's situation then has network effects, and those can be further enhanced by policies that help those improvements transfer through the network. This applies not only to education and employment, but also to things like health, literacy, and other investments.

Taking this view means due to their network effects, policies can have far-reaching and long-lasting impacts, as well as spillovers to other policies. This makes it important to design combinations with a network perspective, and then also to evaluate them by looking beyond the directly treated individuals.[46]

There is much more that we need to understand, especially some of the potential side effects of any social engineering. Networks serve many productive purposes and disrupting them can have unintended consequences.[47] Network effects can be highly nonlinear, and having a better understanding of how to concentrate policies within a network is an active area of research. Finally, the rapid proliferation of technologies that mediate human interactions can have a profound impact on the shape of our networks, not only enriching them, but also amplifying homophily and its impact. Understanding how the incentives of platform designers deviate from social welfare, and how to best leverage technology to improve our interactions and welfare is another important area for further study.

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here is that combined policies, and ones that take into account social forces, can be more effective that policies in isolation or ones that do not account for social structures. Optimizing such policy cocktails to deal with costs is more context dependent.

[46]For an approach to evaluating such policy cocktails, see Banerjee et al. (2021).

[47]There are other helpful policies that can have unintended consequences. For instance, as we find in Banerjee et al. (2020), access to a microfinance program that can help people with investment and consumption smoothing can lead to the deterioration of social networks even among people not involved in the program.

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