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The Internet and income inequality: Socio-economic challenges in a hyperconnected society

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A B S T R A C T

Information and communication technologies (ICTs) influence income distribution directly and indirectly. A diverse pattern of decreases and increases in income inequality has emerged in parallel with increasing fixed and mobile connectivity. Building on earlier research, this paper develops a socio-technical model to examine the contribution of hyperconnectivity to these outcomes. ICTs rarely are a single cause but interact with other technological, economic, and political forces to shape the extent of income inequality. Depending on the constellation of these factors, income inequality may decrease or increase. Public policy may be able to ameliorate undesirable outcomes although effective programs will typically require initiatives that go beyond traditional measures designed to reduce digital divides.

1. Introduction

This paper examines the nexus between digital connectivity and income inequality. While a large body of research explores social inequality in the information society, few studies focus on the links between the Internet and income inequality. Of the ones that address income inequality, most use it as a predictor of differences in Internet access and use. Only a handful of contributions discuss the interdependence of digital connectivity and income inequality. This paper builds on these earlier discussions and develops a modeling framework that allows for a nuanced assessment of the relationships between digital connectivity and income inequality. It shows that information and communication technologies (ICTs) interact with other economic, technological, and political forces in ways that both increase and decrease income inequality. Whether the overall outcome is an aggravation or a weakening of income inequality depends on the relative strength of these opposing forces and the political and institutional context in which they unfold. Given increasing concerns over inequality in current social and political debates, a deeper understanding of this multifaceted relationship is desirable. Fully harnessing the tremendous benefits of ICTs will in no small measure hinge on dealing with their ambiguous effects on income inequality.

Many scholars agree that the widespread adoption of ICTs contributes to recent changes in income inequality, even though the mechanisms are only partially understood. The past two decades saw a narrowing of the global gap in average national incomes after it had been increasing for more than a century. In parallel, inequality at the national level started to increase in many high-income countries and emerging economies even though it declined in others (Atkinson, 2008; Bourguignon, 2015; Milanovic, 2012, 2016). Similar divergent changes are visible at a sub-national level (Grubesic & Mack, 2015; Mack & Rey, 2014). These developments are closely intertwined with the adoption of advanced ICTs, which are, in turn, enablers of the key drivers of changes in income inequality, namely changes in productivity, changes in the location of production, and digital innovation. They are also closely associated with major public policy changes that have repercussions for income distribution.

Debates on the role of information technology on inequality are fragmented into several relatively disconnected threads. Technology

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optimists view income inequality as a temporary phenomenon in the transition to a future high-tech economy. Critics of capitalism see it as consequence of technological unemployment and the gradual emergence of a digital proletariat. Stakeholders trusting in the superiority of societal forces stress the importance of political and institutional choices. This paper seeks to bridge and connect these debates. It develops an integrated socio-technical approach to examine the conditions under which alternative outcomes are more likely, contingent on drivers of inequality and contextual factors. ICTs are typically neither necessary nor sufficient single causes for these developments. Rather, their inequality-increasing and inequality-reducing effects emanate from *interactions* between ICTs and economic, political, and social relationships (see Shaw, 2002, for an early argument along similar lines).

An interest in the links between digital connectivity and income inequality does not imply a plea for *equality*. Increasing income inequality is not per se worrisome as societies with higher average income can tolerate greater income dispersion. However, there is considerable evidence of the potentially corrosive impacts of inequality on society (Atkinson, 2015; Deaton, 2013; Lindert & Williamson, 2016; Milanovic, 2016). High and rising levels of income inequality have been associated with increased crime rates, lower educational achievement, poorer health, the erosion of the foundations of democratic institutions, decreasing civic engagement, the rise of populist movements, and lower economic growth (OECD, 2015; Stiglitz, 2012; Wilkinson & Pickett, 2011). Rather than taking a specific normative position on distributional equity, this paper aims at clarifying the nature and effects of interactions between ICTs and inequality as well as the pressures and policy challenges associated with them.

The arguments presented here contribute in four ways to the research literature. First, a distinction is made between individual-level processes and emergent developments that are the result of interactions between players in the digital economy. The former link inequalities of access and use to positions of individuals and households in the distribution of income. The latter affect income inequality even if individuals and households have comparable access to ICTs. Second, the paper offers a detailed analysis of the economic forces driving these emergent effects. To this end, it develops a socio-technical model of digital inclusion and exclusion processes that affect inequality. This approach allows examining the conditions under which ICT access and use are associated with declining or growing inequality. Third, the paper explicitly recognizes that these processes unfold in a nested system of relations at local, regional, national, and global scales. Differentiated outcomes at these levels are possible and even likely. Fourth, the paper explores the role of institutional conditions in mediating these effects and their implications for ICT policy as well as technology policy more general.

The analysis suggests that ICTs have consequences on income distribution that cannot be effectively addressed with policies designed to close primary and secondary digital divides. In fact, traditional interventions aimed at reducing digital divides might even magnify these ICT-induced dynamics of income inequality. Consequently, more attention needs to be paid to the broader social and political conditions of technology deployment. The paper starts with an overview of the anatomy of income inequality in the information society. A simplified dynamic model of the interactions of ICTs with income distribution is developed in the following section. Subsequent parts examine the effects of technological change, globalization, and digital innovation on income inequality in more detail. Awareness of these effects begs the question of whether anything should and could be done to alter them, a question explored before a recap of the main findings.

2. Income distribution in the information society

The Internet evolved around a technical and social architecture that supports tremendous innovation and empowers players at the edge of the network. Digital innovation has great benefits but it also undermines existing business models and income streams. As connectivity expanded and unanticipated consequences became more visible, critical voices started to articulate potentially undesirable effects of hyperconnectivity on privacy, civic participation, and income inequality (e.g. Lanier, 2013; Taylor, 2014). To prepare our analysis, this section briefly discusses approaches to measuring inequality and reviews some of the surprising changes in income distribution since the late twentieth century.

As the economic and social opportunities of individuals and households are strongly influenced by their position along the distribution of income and wealth, this paper focuses on income inequality. However, inequality manifests itself in numerous ways, including in variations in income, consumption, and access to education and health (Mills, 2009). Each of these indicators has strengths and weaknesses yet they often move in the same direction (e.g. Heathcote, Perri, & Violante, 2010). For example, consumption inequality is typically less pronounced than income inequality because individuals and households temporarily may be able to sustain a level of consumption with loans or other forms of non-market exchange. Widely used indicators of income inequality include mean and median incomes and earnings ratios (e.g. the quotient of the earnings of a household at the 90th compare to one at the 10th percentile of the income distribution). Broadly construed indices such as the Gini coefficient and the Theil index encapsulate additional dimensions of the income distribution.[1] These metrics allow longitudinal and cross-sectional comparisons at different levels (e.g. individual, household, and nation) and within alternative geographical boundaries (e.g. municipality, country, and world). Global comparisons may rely on the average GDP per capita, population-weighted mean incomes, unweighted mean incomes, or individual incomes.

Recent studies have corroborated that, during the past three decades, global income inequality has decreased, reversing a development that started with the industrial revolution and was only briefly interrupted after World War II. Bourguignon and Morrison

[1] The Gini coefficient measures inequality of a frequency distribution. A value of 0 corresponds to complete equality and a value of 1 to maximum inequality. Several different formulas have been proposed to measure income dispersion. The most often used method builds on the Lorenz curve, calculating the ratio between the line of equality and the Lorenz curve relative to the entire area under the line of equality. One potential weakness of the Gini is that a specific index value can be the outcome of multiple underlying distributions. The Theil Index is a special version of a generalized entropy index that can also be utilized to measure income inequality. It allows decomposing changes in inequality into within-group (country) and between-group (country) effects, which is often useful in international comparisons.

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