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Service Industrialization, Employment and Wages in the US Information Economy

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ABSTRACT

The US economy has undergone significant shifts towards services and towards information intensive industries. The latter trend has been driven by advances in information technology. These advances have concurrently led to substantial changes in the production and delivery of services, especially notable in information-intensive sectors. We examine these changes from the perspective of "service industrialization", since they are similar in many ways to the historical industrialization of goods production. We focus on the effect of industrialization on employment and wages, and identify certain important consequences of this direction. One major consequence is the impact on the customer facing services and the "front office" in addition to the effect on service processes in the "back room". An important aggregate result is a decline in white collar jobs in both those categories. A larger effect is at the sector level, with significant disruptions in

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some sectors leading to their substantial restructuring. Such disruptions are likely to occur in other information intensive sectors as well.

Keywords: information economy; service industrialization; US economy; jobs; employment; job and employment trends; information intensive services.

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1

Introduction

There appear to be wide-spread popular and professional concerns about jobs, employment, and wages in the US. This is visible in articles in the popular press, in political positions across the spectrum, as well as in the academic and research literature. The concerns relate to job availability and the growing inequality in incomes and wealth. The reasons underlying the concerns include the loss of jobs to other countries, the effects of globalization and trade (including the "China effect"), differential productivity levels, and the threat of technology and automation replacing humans in jobs. To these underlying factors we could add the effects of demographics and changes in the working and dependent populations, global competition, shortcomings in education, technology-enabled restructuring of industry, and the impact of national policies in areas such as immigration and trade.

Our emphasis in this paper is on "service industrialization". This term refers to the recent and ongoing changes in the economy, and in industry sectors, markets, companies, processes and organizations, which have been enabled or created by new information technologies related to computers and telecommunications. These changes are especially concentrated in information intensive service sectors, but are also very

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apparent in physical services such as retailing and transportation. They are also directly and indirectly affecting many aspects of manufacturing. Our perspective of "industrialization" is based on the traditional view of that term, as applied to manufacturing and products, but expanded to include the impact of modern information technologies, which affect consumer behavior, markets, interactive communications, and social structure.

The paper has three main research objectives

- Study the impact of service industrialization on employment and wages in the US and understand the forces driving them,
- Using national income and labor data until 2017, update our earlier study of the size, structure, and trends in the US Information economy in a way of presenting a macroeconomic context for our analysis of employment and wages, and
- Identify implications of the above for management and public policy.

Our main conclusions regarding employment and wages are that

- Technology driven service industrialization has had and continues to have a substantial impact on the structure of the US economy, with the largest effect being a growth in the GNP, job and wage shares of information intensive industries
- Service industrialization has had a negative impact on jobs through automation, offshoring, outsourcing, large scale disruption, and process changes in processing and delivery. These effects are ameliorated by a growth in physical services such as food services, personal services and health care, so that there are enough jobs and unemployment has been and is likely to remain low.
- A major current effect of service industrialization on jobs is the recent decline of white collar jobs (such as Sales and related, and Office and Administrative Support) in terms of employment share and wage share.

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- There have been increases in employment in the occupational categories of Management, Business and Financial Operations, Computer and Mathematical occupations. The wage shares in these occupations have also increased, since these are all high-wage job categories.
- The preceding two effects are increasing income inequality among white collar workers.
- Industry sectors showing declines in employment and wage share due to service industrialization include Retail Trade, Wholesale Trade, and Finance and Insurance.
- While the Arts, Entertainment and Recreation sector is holding up in share, specific subsectors such as music distribution and news publishing have seen severe disruptions, which do not show up in the aggregate sector figures. We believe that these disruptions will soon spread to other content delivery subsectors such as publishing and broadcast entertainment.
- Managers in many, if not all sectors need to pursue service industrialization strategies, or risk being overtaken by new entrants, or left behind as service sectors restructure
- There are significant policy implications from these shifts, arising from the impacts on jobs, and employment shifts, which directly affect wage distribution and inequality of income.

In the next section, we present a brief review of relevant literature. In the third section we discuss service industrialization and the "services revolution". We then present an update of the major trends in the US economy up to 2017, in the fourth section. As in our past work (Apte *et al.*, 2008 and 2012) we examine the structure of the US economy in terms of the breakdown of GNP and GNP shares along two dimensions: products vs. services, and material intensive vs. information intensive activities. This aggregate view clearly shows the two major trends along those dimensions: a move from products to services and from material to information. We also look at the trends in jobs and employment share,

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and in shares of the total wage bill. In the fifth section, we identify and discuss the forces including service industrialization that are driving the changes in the economy with an emphasis on the employment and job effects. The sixth section presents a more detailed breakdown of jobs based on SOC (Standard Occupational Classification) codes, and wages by sectors based on NAICS (North American Industrial Classification System) codes. We present the distribution of job shares and wage bill shares along these two dimensions. This gives a clear picture of the sectors and job categories that contribute the most in terms of jobs and wages, which though correlated, are not the same. We present data on how job and wage bill shares have changed over the period from 2002 to 2017. There are clear patterns that emerge, and we relate these to the previous discussion of the factors driving the trends in the economy. We then present other important observations and conclusions regarding service industrialization and demographic changes in the seventh section. In the eighth section, we discuss the implications of the trends discussed earlier for managers and policy makers to address the issues that are being faced at all levels of the economy. Finally, we present our concluding remarks about the potential for future research in the ninth section.

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