Technological Forecasting & Social Change xxx (xxxx) xxx–xxx

Contents lists available at ScienceDirect

Technological Forecasting & Social Change

journal homepage: www.elsevier.com/locate/techfore

The impact of technological change on employment: The case of press digitisation

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ARTICLE INFO

Keywords:
Technological change
Digitisation
Newspapers
Employment
Creative destruction
Casualization

ABSTRACT

Based on an exhaustive dataset of all journalists in France, this article investigates the impact of digitisation on the employment of journalists in the press industry. In particular, focus is put on the effect played by the level of digitisation of newspapers and magazines, some of which have resisted digitisation, while others have embraced it. We find that greater levels of digitisation tend to increase the likelihood of job creation and reduce the probability of job destruction. Likewise, higher level of digitisation leads, on average, to higher earnings for journalists. At the same time, though, higher digitisation also increases sharply the likelihood that jobs created are of casual contractual natures, as opposed to regular permanent contracts. Yet, we find that digitisation also has a positive impact on the earnings of journalists on a casual contact (though, far less than for 'tenured' journalists). More surprisingly, we show that digitisation also reduces job instability of those journalists on a casual contract, as a greater level of digitisation reduces the likelihood of job destruction, even for casual jobs. Though, while digitisation tends to change the contractual nature of job created, embracing digitisation appears to be a 'lesser evil' than resisting technological change.

1. Introduction

While any technological change is bearer of economic and social disruptions, it is safe to say that the development of digital technologies and the digitisation process that has ensued are at the root in numerous industries of the single biggest disruption that has happened in decades (in some cases, centuries). Whether in media industries, service industries, content industries, long-time incumbents in control of the market for aeons were suddenly wiped out in just a matter of years.

In this respect, the example of the press industry is quite striking. Once the only way to obtain news (if we leave aside word of mouth), newspapers and magazines survived the advent of radio (in the 1930s) and television (in the 1950s) only to be crushed by the arrival of the Internet in the 1990s. As a result, in the U.S. alone, 16,200 newspaper jobs and 38,000 magazine jobs were wiped out between 2003 and 2012 (Jurkowitz et al., 2014) and while 'online' jobs have been the rise, they still account for less than 10% of the jobs destroyed (White, 2012).

Yet, overall, digitisation has obvious benefits. As demonstrated by Katz and Koutroumpis (2013), there is a strong positive link between the level of digitisation, economic growth and social welfare. Likewise, Sabbagh et al. (2013) find a clear global positive impact of digitisation on job creation, though they highlight differences between industries, some of which experience a net destruction of jobs, while others enjoy a sharp boost in employment.

Hence, digitisation is just a typical case of creative destruction, as defined by Schumpeter (1942): digital technologies have triggered a "process of industrial mutation […] that incessantly revolutionises the economic structure from within, incessantly destroying the old one, incessantly creating a new one".

As is generally the case with technological change, it is clear in the case of digital technologies that, overall, 'creation' has exceeded (by far) 'destruction'. Yet, while the overall picture is clear, details remain quite blurry. In this respect, the question of the impact of digitisation on labour is certainly one of the most sensitive ones. While controversies about the impact of technological change on labour are anything but new,[1] the current climate of economic crisis makes this issue particularly critical.

Unfortunately, whereas at macro and industry/sectorial levels it may be possible to determine the net effect of technological change on labour, it is generally far more difficult to do so at micro-level, as even in the most affected industries, while jobs are indeed destroyed, others are created.

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[1] In this respect, the 19th century American folk story of John Henry defeating a steam machine, but dying as a result of it is particularly illustrative.

http://dx.doi.org/10.1016/j.techfore.2017.10.015
Received 11 November 2016; Received in revised form 6 September 2017; Accepted 21 October 2017

Thus, beyond the sole matter of the net (aggregate) effect on the number of jobs lies the question of the actual relationship between technology adoption and job destruction, i.e. are jobs more likely to be destroyed in companies that embrace technological change than in the ones that do not? The effect of technology is a priori ambiguous. On the one hand, one could expect companies that adopt technology rapidly to outperform those that do not, and, consequently, be less likely to lay workers off. On the other hand, making a greater use of technology typically calls (ceteris paribus) for less labour being used.

Furthermore, the question of the 'quality' of the jobs created in comparison to the jobs destroyed is just as important. For instance, while technological change has led to the destruction of many mining jobs, created jobs were, thanks to mechanisation, much safer and far less health-hazardous. In contrast, the journalist positions created following the advent of the Internet are generally far less advantageous than those that were destroyed and, as noted in White (2012), there has been a strong rise of freelancer type jobs (which now make up to 60% of the work force in EU countries).

A final question is whether, in those industries that are affected, it is better for those who remain in employment to work for a company that embraces technological change to its full extent, as opposed to one that does not. While in the case of the mining industry, the former is certainly better than the latter, this is not so clear in the case of digitised industries, where newly created jobs are likely to be far less secure and of a more casual nature.[2]

The answer to these questions is generally hard to find because available data is almost always aggregated to some extent and it is exceedingly rare to have industry-scale individual data. While surveys have been conducted, the resulting conclusions suffer the inherent limitations (in particular in regard to generalisation) of this kind of non-exhaustive data (Pianta, 2006).

In contrast, this research is based on the analysis of an exhaustive micro-level dataset. Indeed, in France, unlike in other countries, having a press card is a de facto requirement for all journalists. When applying for a press card (which happens yearly), journalists have to supply a significantly large amount of information (e.g. gender, age, experience, income, main employer, work status, type of contract, diplomas). For the purpose of this research, this highly unique and exhaustive (anonymised) database is combined with another official database that lists the subscription and sales figures (offline and online) of all French newspapers and magazines.

Doing so enables a study that has the advantages of micro-level analysis (in particular, the highly detailed observations enabled by individual data) while avoiding the traditional pitfalls of this level of analysis (namely, the lack of tangible generalisation). In this particular case, this means that we are able to observe the creative destruction process caused by digitisation on the labour market in the press industry, based on the degree of adoption of the technology of each individual newspaper and magazine, and on the individual characteristics (e.g. age, gender, education, experience) of each single journalist.

This rather unique level of detail enables us to answer the following questions: 1) how does the level of "technology embracement" (in this case, adoption of digital technologies) of press outlets impact the job destruction process? 2) how does the level of digitisation impact the job creation process? 3) how does the degree of digitisation affects the quality of jobs (in regard to contractual status, i.e. permanent vs temp jobs)? 4) what is the impact of the degree of digitisation on journalist wages?

By answering these four questions, this research aims to fill a gap in the detailed, micro-level, understanding of the impact of digitisation on labour. In this respect, it is important to note that the press industry was arguably the first to be disrupted following the advent of the Internet in the early 1990s. Consequently, the effects of digitisation observed in this research are long-term ones.

This article is organised as follows. The first section provides an overview of the relevant literature. The second section introduces the methodology. The final section details the results obtained.

2. Literature review and hypotheses

While there is little doubt that, overall, technological change has been highly beneficial to our societies, it is also obvious that, in general, the introduction of a new technology does not make every single individual better off. For instance, as noted in Trannoy (2002: 125), "there is no question that new information technologies represent a source of wealth for society taken as a whole. The question of the impact of these technologies on distribution issues, either at a national level or at an international one remains open."

This ambiguous impact of technological change has been particularly clear since the early days of the First Industrial Revolution, when mechanisation became both a source of great life improvements and a seed of pauperisation for the working classes, whose jobs were progressively eaten away by machines. For the economists of the day, the positive effect of technological change (in that case, mechanisation) on employment was far from being obvious, many believing that more jobs would be destroyed than created. Even a 'modern' economist such as David Ricardo had to concede that technological change might indeed be more favourable to "landlords" and "capitalists" than to the "labouring class", whose feeling "that the employment of machinery is frequently detrimental to their interests, is not founded on prejudice and error, but is conformable to the correct principles of political economy" (Ricardo, 1821).

In the midst of the post WWII golden years, characterised by technological progress, high growth and full employment, this duality of technical change was nearly forgotten. But the economic crises of the 1970s, as well as the concurrent growing adoption of automation, put this question back into focus. In the early 1980s, Godet (1983) pointed out that, in a context of perpetual crisis and high unemployment, the negative impact of technological change on labour markets was a necessary evil, "but no doubt less worse than if one were not to proceed with [implementation of technology]".

Indeed, as emphasised by Henize (1981), the introduction of a new technology, through the resulting increase in labour productivity, affects the demand for labour in two opposite ways. On the one hand, the increase in labour productivity decreases ceteris paribus the demand for labour. On the other hand, the increased labour productivity also enables to decrease relative prices and increase the quality and accessibility of products (and services). This, in turn, results in additional demand for the products and, hence, for labour, which may partially or totally offset the labour-displacing effect of productivity growth.

Besides the question of the direct impact of technological change on employment, addressed within the context of automation by Ishitani and Kaya (1989), Mori (1989) and Torii (1989), assessing the overall effect (i.e. direct and indirect) of technological change on employment has been a critical issue in the literature ever since. For instance, Saito and Nakamura (1989) find that while the impact of robotisation in Japan for the period 1985–1990 is, overall, positive (+0.03% GNP growth p. a.), its direct effect (jobs destroyed) is nearly 50% greater than the indirect effect (jobs created). In this respect, Alic (1997) points out that although in the past technological change had, overall, a net positive effect on job creation, this may no longer be the case as technology is now reducing the direct labour content of production in nearly all sectors. As a matter of fact, several studies, conducted at industry-level (Antonucci and Pianta, 2002; Evangelista and Savona, 2002; Meyer-Krahmer, 1992) and firm-level (Brouwer et al., 1993) have found a negative impact of technological change on employment.

[2] Journalists with casual contracts are not in a traditional employment relationship as explained by Bosch (2004): "a stable, socially protected, dependent, full-time job…the basic conditions of which (working time, pay, social transfers) are regulated to a minimum level by collective agreement or by labour and/or social security law" (p.618–619).