

Comment

The impact of globalisation and technology on local labour markets

Comment on the articles “*Technical change and automation of routine tasks: Evidence from local labour markets in France, 1999-2011*” by Pauline Charnoz and Michael Orand and “*Measurement and anticipation of territorial vulnerability to offshoring risks: An analysis on sectoral data for France*” by Hugues Jennequin, Luis Egidio Miotti and El Mouhoub Mouhoud

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Abstract – The rise of new technologies and globalization has recently generated major structural changes in developed economies. These changes alter significantly economic activities and affect spatial disparities. The articles by Charnoz and Orand and by Jennequin, Miotti and Mouhoud offer two original analyses of changing patterns in local labour markets in France. They show that structural changes affect employment zones differently depending on their employment structure and their international exposure. Because of their specialisations in high value-added jobs, major cities emerge the winners from these changing patterns. The rural territories and cities traditionally specialised in routine jobs have, meanwhile, turned to computers and robotisation and are thus experiencing a decline in these jobs. This phenomenon is magnified by offshoring. These papers have important implications for economic policies, as they identify the infranational territories that may have large effects on employment and wages trends at the national level.

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Reminder:

The opinions and analyses in this article are those of the author(s) and do not necessarily reflect their institution's or Insee's views.

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The growth of new technologies and global trade has, in recent decades, led to major structural changes in developed economies. These changes are profoundly altering economic activities and transforming their comparative advantages. They also operate within sectors of activity by reallocating resources between companies, occupations and tasks within a single sector. These developments have in turn resulted in a polarisation of employment, which is characterised by an increase in the proportion of low-wage and high-wage jobs, at the expense of intermediate-pay jobs. By fostering the reallocation of these intermediate-pay jobs to higher-wage and lower-wage professions, but by also removing some workers from the labour market, this phenomenon is accompanied by widening wage inequalities.

Several papers using data for the United States (Autor & Dorn, 2013) and the United Kingdom (Goos & Manning, 2007) have highlighted the ongoing polarisation of the labour market. The phenomenon has also been observed in Germany (Spitz-Oener, 2006), France (Harrigan, Reshef & Toubal, 2016) or other European countries (Adermon & Guvstasson, 2005; Goos, Manning & Salomons, 2009). While these studies can clearly identify the phenomenon, the consequences of globalisation and the dissemination of technologies on the distribution of employment and its structure at the infra-national level are still little known in France. The articles by Charnoz and Orand and Jennequin *et al.* propose to analyse the shift in employment patterns across French employment zones and to identify the impact of the dissemination of technologies and globalisation on local labour markets in France.

The concept of employment zone is particularly suited for both analyses. It is based on the empirical observation of the low mobility of workers most often looking for job opportunities in their local labour market. Labour market equilibrium is thus specific to each employment zone. Differences in wages and employment rates between the various local labour markets can be particularly stable over time, leading to a certain persistence in regional employment and wage disparities.

Technical change, tasks and activities

One of the most favoured hypotheses in studies of the impact of technical change on employment is that of technical change biased toward

non-repetitive tasks (Autor, Levy & Murnane, 2003). It is suggested that the spread of technical change would reduce the demand for labour of those performing routine tasks, the said workers being gradually replaced by computers and automation. In most cases, these are machine operators and office employees classified as occupying intermediate-pay occupations. Quite to the contrary, technical change is complementary to the non-routine cognitive tasks performed by highly skilled workers and very high-wage occupations. It would increase demand for them and in turn the wages in these occupations (directors, engineers, researchers). As for manual tasks, which are characterised by a combination of specific motor movements (services to individuals, construction, etc.), they are still difficult to replace by machines or computers. The dissemination of technical change would therefore have very little impact on professions with high content in manual tasks, most often located at the bottom of the wage scale. Thus, based on the hypothesis of skill-biased technical change, the weight of low and high wage categories should increase compared with that of categories based on repetitive, gradually automatable tasks.

One can intuitively see the consequences of this routinisation hypothesis at the local level. Although companies located in the different employment zones in France should all have access to the same technologies, technical change has distinct consequences depending on the local labour markets as a result of a combination of industry, professions and differing tasks. These local specialisations are mostly inherited from the past and primarily related to the physical geography of natural resources. Thus, the nearby availability of a crucial raw material such as coal in northern France, or proximity to a river or access to infrastructures, largely explains these local combinations. However, by reducing communication costs, technical change can also amplify spatial disparities by accentuating the functional specialisations of employment pools. The analysis of Jennequin *et al.* like the one of Charnoz and Orand, moreover, show that the activities requiring support functions are more prevalent in large agglomerations and medium-sized cities.

As the article by Charnoz and Orand shows, local-level specialisations are very heterogeneous in France, where routine jobs are not located in the same employment zones as service jobs. Moreover, these routine jobs are concentrated in northern France, a highly industrialised region,

in the Parisian area and in a few agglomerations. Based on a relatively short period of time, the analysis of Charnoz and Orand shows that the local employment pools which largely employ a workforce carrying out repetitive tasks in 1990 adopted more information and communication technologies and experienced a significant decrease in routine employment in 2011. These employment zones, which are highly dependent on routine tasks, have seen these tasks progressively become automated, replaced by computers and robots. These developments were moreover very unfavourable to the least-educated workers by increasing this population's unemployment rate. From 1990 to 2011, local job pools therefore experienced a polarisation in employment.

Exposure to international competition and local labour markets

The comparison between different local labour markets does not only make it possible to establish a more direct link between technical change and jobs polarisation, but also to distinguish the effects of technological change from other important economic factors.

In addition to the role of routinisation as a result of technical change, many authors have associated the phenomenon of polarisation with that of globalisation (Autor *et al.*, 2013a, 2013b, 2015; Goos, Manning & Salomons, 2014; Malgouyres, 2016). Globalisation increases the trade in goods, services, capital and knowledge, but also speeds up the spread of technology. It also offers companies the opportunities to reorganise their activities at the global level, either through trade or by locating all or part of their production activities for goods and services in foreign countries. These reorganisations are not just important in the manufacturing sector, as shown by the analysis of Jennequin *et al.*; they are also significant in services. Globalisation could therefore be an alternative factor explaining the decline on the proportion of intermediate professions by replacing, for example, the tasks associated with these jobs with those carried out by a less costly workforce abroad. It can also favour highly qualified workers by increasing the demand for non-routine tasks, those associated with organisational changes or related to management and communication between a company's foreign affiliates.

In addition to the inequalities between jobs and socio-occupational categories, globalisation

can generate disparities between different employment pools. These effects will differ depending on the places where internationalised companies choose to locate, and depend on the growth or decline of the latter. Through an induced effect, territories will be affected to varying extents, depending on the intensity of their exposure to globalisation. As with technical change, the effects of globalisation can also be differentiated according to the characteristics of local labour markets. The study by Jennequin *et al.* enables to identify the local labor markets that are particularly exposed to international competition and offshoring. The approach is statistical and aims to construct an indicator reflecting the vulnerability of employment zones to the risk of offshoring, based on the characteristics of jobs (tasks and qualifications), products and productive processes (positioning of sectors in terms of quality and international fragmentation of value chains).

The analysis highlights the sectors the most exposed to the risk of offshoring (textiles/clothing, furniture and machining and electronic equipment) and those less exposed (luxury products, chemicals and pharmaceuticals). These results confirm that sectors that are vulnerable to the risk of offshoring are also those producing highly differentiated varieties of goods, or goods with high added value. The sectors affected by the risk of offshoring are those with activities intensive in routine tasks. Globalisation would thus reinforce the negative effects of technical change on routine jobs.

The mappings presented by Charnoz and Orand and Jennequin *et al.* show a certain coincidence of the effects of technical change and globalisation on local labour markets. In principle, there would be a correlation between the areas which would be the most affected by technical change in the study by Charnoz and Orand and those that would be the most vulnerable to offshoring in the study by Jennequin *et al.* However, according to the study by Autor, Dorn and Hanson (2013b) for the United States, the local labour markets that are mostly affected by technical change are not necessarily those that experience a dramatic increase in competition from Chinese imports (see also Autor, Dorn & Hanson, 2015). Blinder (2009) argues that the repetitive nature of some tasks is only partially related to the offshorable nature of certain activities. It is therefore necessary to analyse technical change and globalisation jointly in order to

isolate their respective effects on employment and its structure.

The empirical analysis of individual firm-level data on jobs and wages from annual administrative data (DADS) in France, matched with those on international trade in the Customs Database and those drawn from the French *SIRENE* database (directory of establishments and companies), enabling geo-location of companies by employment zone, would be an interesting way of taking the study by Charnoz and Orand to greater depth, distinguishing between the effects of globalisation on local labour markets as compared with those of technological change.

Impact of international trade on employment and its structure

The question as to the impact of globalisation on employment in developed countries can be answered only in part. So long as data are lacking, it will be difficult to assess the effect of increased trade in services, goods and offshoring at the same time. We do, however, have more perspective on the impact of international trade in goods because the data are much more precise. We can therefore expect a greater effect from international trade on the most exposed sectors. This is the case with the manufacturing sector in France, which concentrates the most internationalised firms. The analysis conducted at company level by Harrigan *et al.* (2016) shows that the growth reported by firms that have chosen to go international is in fact not so different from that of firms that have not taken this path. These average effects nevertheless mask significant growth disparities depending on the type of goods traded and their country of origin or destination. While exports have very little effect on growth in employment among firms (irrespective of the type of good or country of destination), a more in-depth analysis reveals lower employment growth for companies with intermediate products originating from low-wage countries. These effects tend to confirm the negative impact of competition from low-wage countries on employment (Autor, Dorn & Hanson, 2013a).

While the assessment of a net positive impact of globalisation on employment in developed countries is consensual in the literature (Crozet & Orefice, 2017), it also emphasises that adjustment costs are not borne in the same way depending on workers' age and qualification, and that there are also significant regional

or local disparities. Consequently, the costs are higher for older and relatively less qualified workers as well as for workers who are highly exposed to international competition. Given the low sector diversity within the regions and relatively low mobility for less skilled workers, the effects of globalisation can strengthen those of deindustrialisation by creating zones of inactivity when wages are rigid.

The analysis of Biscourp and Kramarz (2007), carried out at the level of companies located in France, shows that competition from imports is specifically associated with the destruction of production jobs, and especially that of unskilled workers. In particular, the import of finished products, a manifestation of foreign offshoring of all or part of local production, most prominently accompanies the decline in relative demand in unskilled employment. Harrigan *et al.* (2016) confirm this result in an analysis of a more recent period.

Since the majority of economic activity is organised by firms, changes in their status, in their internal organisation and in their dynamics are important factors that generate both structural changes and a change in the distribution of jobs and wages. Consequently, the firm-level analysis is well-suited for identifying the causal mechanisms of adjustment. Overlooking the importance of the firm can be misleading as we can illustrate below.

According to the hypothesis of skill-biased technical change, technical change reduces the proportion of intermediate professions in favour of high-wage and very low-wage jobs. It is thus assumed that there would be a substitution between socio-occupational categories, this phenomenon being strengthened by the globalisation process. However, the shifts observed in the studies by Charnoz and Orand and Jennequin *et al.* can mask organizational changes at company level. The fact that there is substitution does not mean that this should be considered the only explanation for changes in the employment structure of the regions. These changes could be due to the growth of firms that compose them and to the fact that they intensively use some occupations or tasks rather than others. Alongside the substitution effect, one can add a composition effect based on changes in a company's size. Although the composition effect is significant, the hypothesis of technical change biased in favour of non-repetitive tasks would only partially explain the polarisation of jobs. The firm approach therefore makes it possible

to distinguish between competing theories of the determinants of structural change and its impact on the distribution of jobs and incomes.

The future of employment

Technology plays a major and constant part in employment and its structure in all sectors, while the effects of globalisation appear to be more nuanced and concentrated in the manufacturing sector. It is entirely conceivable that, with the exponential advances in artificial intelligence, robotics and algorithms, as well as with the rapid rise of emerging countries, intellectual occupations, which have been quite the winners in recent decades, may also be threatened in developed countries in the future. With regard to the impact of technological change, Frey and Osborne (2017) estimate that 47% of jobs in the United States are likely to disappear by 2020. However, their methodology has been challenged and Arnzt *et al.* (2016) assess that on average only 9% of US jobs are actually at high risk of automation. Very recently, the *Conseil d'Orientation de l'Emploi* (2017) confirmed this estimate where France is concerned, pointing out that “fewer than 10%

of jobs accumulate vulnerabilities that could threaten their existence in a context of automation”.

Technological change and globalisation can create losers, but they also bring about opportunities in terms of jobs and wages for certain categories of workers. Existing jobs are furthermore destined to undergo profound change. For technical change and globalisation to benefit to all, workers need to be able to master new technologies and to have the necessary qualifications to take full advantage from the benefits that international trade provides. This is what Jan Tinbergen termed, already in 1974, the “*race between education and technology*” (Tinbergen, 1974). In this sense, it is essential to increase the efficiency and equity of the initial training system, but also that of continuing training. Lifelong learning is what enables individuals to escape skills obsolescence, down-grading and unemployment. The gains generated by technological change and globalisation also need to be better distributed among workers (more winners, fewer losers), so as to increase demand and thereby promote job creation. □

BIBLIOGRAPHY

- Adermon, A. & Gustavsson, M. (2005).** Job Polarization and Task-Biased Technological Change: Evidence from Sweden, 1975-2005. *Scandinavian Journal of Economics*, 117, 878–917.
doi: 10.1111/sjoe.12109
- Arntz M., Gregory, T. & Zierahn, U. (2016).** The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis. *OECD Social, Employment and Migration Working Papers*, N° 189. Paris: OECD Publishing.
doi: 10.1787/5j1z9h56dvq7-en
- Autor, D. H., & Dorn, D. (2013).** The growth of low-skill service jobs and the polarization of the US labor market. *The American Economic Review*, 103(5), 1553–1597.
doi: 10.1257/aer.103.5.1553
- Autor, D. H., & Dorn, D. & Hanson, G.H. (2013a).** The China syndrome: Local labor market effects of import competition in the United States. *The American Economic Review*, 103(6), 2121–2168.
doi: 10.1257/aer.103.6.2121
- Autor, D. H., Dorn, D. & Hanson, G. H. (2013b).** The Geography of Trade and Technology Shocks in the United States. *The American Economic Review*, 103(3), 220–225.
doi: 10.1257/aer.103.3.220
- Autor, D. H., Dorn, D. & Hanson, G.H. (2015).** Untangling Trade and Technology: Evidence from Local Labour Markets. *The Economic Journal*, 125(584), 621–646.
doi: 10.1111/eoj.12245.
- Autor, D. H., Levy, F. & Murnane, R. J. (2003).** The Skill Content of Recent Technological Change: An Empirical Exploration. *The Quarterly Journal of Economics*, 118(4), 1279–1333.
doi: 10.1162/003355303322552801
- Biscourp, P. & Kramarz, F. (2007).** Employment, skill structure and international trade: Firm-level evidence for France. *Journal of International Economics*, 72(1), 22–51.
doi: 10.1016/j.jinteco.2006.07.005
- Blinder, A. (2009).** How Many US Jobs Might be Offshorable? *World Economics*, 10, n°2, 41–78.
doi: wej:wldecn:376
- Conseil d’Orientation de l’Emploi (2017).** *Automatisation, numérisation et emploi*. Tome 1: Les impacts sur le volume, la structure et la localisation de l’emploi. Rapport du COE.
- Crozet, M. & Orefice, G. (2017).** Trade and Labor Market: What do We Know? *CEPII Policy Brief*, N° 2017-15.
- Frey, C. B. & Osborne, M. A. (2017).** The future of employment: How susceptible are jobs to computerisation? *Technological Forecasting and Social Change*, 114(C), 254–280.
doi: 10.1016/j.techfore.2016.08.019
- Goos, M. & Manning, A. (2007).** Lousy and Lovely Jobs: The Rising Polarization of Work in Britain. *The Review of Economics and Statistics*, 89(1), 118–133.
doi: 10.1162/rest.89.1.118
- Goos, M., A. Manning, & Salomons, A. (2009).** Job Polarization in Europe. *The American Economic Review*, 99(2), 58–63.
doi: 10.1257/aer.99.2.58
- Goos, M., A. Manning, & Salomons, A. (2014).** Explaining Job Polarization: Routine-Biased Technological Change and Offshoring. *The American Economic Review*, 104(8), 2509–2526.
doi: 10.1257/aer.104.8.2509
- Harrigan, J. A., Reshef, A. & Toubal, F. (2016).** The March of the Techies: Technology, Trade, and Job Polarization in France, 1994-2007. *NBER Working Paper* N° 22110.
doi: 10.3386/w22110
- Malgouyres, C. (2016).** The Impact of Chinese Import Competition on the Local Structure of Employment and Wages: Evidence from France. *Journal of Regional Science*, 57, 411–441.
doi: 10.1111/jors.12303
- Spitz-Oener, A. (2006).** Technical Change, Job Tasks and Rising Educational Demands: Looking Outside the Wage Structure. *Journal of Labor Economics*, 24(2), 235–270.
doi: 10.1086/499972
- Tinbergen, J. (1974).** Substitution of Graduate by Other Labour. *Kyklos*, 27(2), 217–226.
doi: 10.1111/j.1467-6435.1974.tb01903.x
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