Inequality and technical change: old and new theories of segmentation[°]

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1. Wage distribution. Evidence

Since the late 1970s, income inequality has been on the rise in a number of OECD countries, although nowhere it has increased as much as in the UK and the US (Gottschalk and Smeeding 1997). Many factors enter into the determination of income inequality. Low pay and unemployment, especially of people other than head of family, play an important role in determining households' poverty, while government redistributive programs exert an important compensatory role - the latter for instance account for the stability of income in Canada and most European continental countries (Ruiz-Huerta et al. 1999). Income inequality is strongly correlated with the evolution of earnings inequality. While the US (and the UK) have experienced the sharpest increase in wage inequality, recent research seems to suggest an acceleration in the widening of wage differentials and an increase of the "working poor" also in some continental European countries (cf. Ruiz-Huerta et al. 1999 for comparative analysis of wage dispersion; Howell and Huebler 2001 for a critical assessment; Brandolini et al. 2000 for Italy).

As in the US and in the UK, the rise in earnings inequality in the EU countries is to be ascribed to changes at the margin of the labour market: a rise in low pay jobs which is accounted for by the increasing importance of new flexible "non standard" patterns of employment[1]. A EU comparative analysis on quality in work and social exclusion (EU 2001, p.76) concludes that in 1996 almost a quarter of the European workforce were in jobs of low quality, with the highest share among temporary contract workers, and especially temporary workers in part-time jobs[2]. The same

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[1] Among these new forms, self-employment has been assuming an increasing importance in many countries, so that its exclusion from analysis on low pay significantly underestimates low pay jobs. In fact, many of these self-employed contractors are not different from employees except for being less paid and less protected, since they fall outside the coverage of labour laws, which were based on the need to protect the employee from the imbalance of bargaining power.

[2] The study classifies jobs according to criteria such as job security, career prospects and pay into four categories: dead-end jobs; low-pay-productivity jobs; decent jobs; and good jobs. Cf. EU (2001, p. 65) for a description of the database.

correlation between low-pay and contingent work is obtained in country studies (Mishel et al. 2001, Cormier and Craypo 2000, Brandolini et al. 2000[3]).

The share of temporary and part time jobs and the distribution of jobs by quality differ widely across countries (EU, 2001, chart 109, p. 75). Care should be used however in drawing conclusions. In fact, the share of temporary and part time jobs (for instance the incidence of voluntary part-time in female employment) reflects both the structure of society and the institutions of the various labour markets so that it can have different implications in terms of quality of jobs and worker's satisfaction. Moreover, depending on the median level of wages, low-pay or decent jobs can have different implications in terms of absolute poverty. Finally, although the socio-demographic characteristics of low-pay workers are common across countries - women, youth, unskilled workers, immigrants, workers in poor regions - their relative position, and, above all, their probability of transition out of a low-pay job, vary markedly with the institutional national setting (for instance, the relative position of youths varies with the importance of institutional arrangements such as vocational training).

For many workers, low wages may be a permanent, rather than transitory status. The high probability for workers to be trapped into low-pay, dead-end jobs represents the most severe cause of cycles of poverty and social exclusion and the most serious challenge for policy. Several studies have documented the extremely limited career mobility at the bottom of the job ladder: according to the EU study quoted above, on average a bit more than a third (38,1%) of all those employed in dead-end jobs in 1995 changed to a better job within a year (of these, 14% entered into low-pay jobs); this means that the remaining 62% either got trapped into dead-end jobs (36,3%) or fell behind into unemployment or inactivity. The proportion of workers moving up was even lower for low pay-productivity jobs: only 23% moved up, while more than half (52.2%) remained trapped into low pay jobs, and the rest fell behind either into dead-end jobs or into unemployment and inactivity (cf. EU 2001, table 25 p. 77). Similar results are reported for individual countries, although the characteristics of the various institutional assets do affect the probabilities of transitions from status[4].

[3] Brandolini et al. (2000, p. 15) have studied the evolution of earnings distribution in Italy. They observe that while the incidence of low pays among full time workers remains around 12% between 1993 and 1998, it reached 18.3% for all (part-time and full-time) workers (up from a minimum of 8.1% in 1989).

[4] Using longitudinal micro-data covering the period 1975-1995, Lucifora (1998) found that individuals who start from the lower ends of the distribution are less likely to move up. About 50 per cent of the workers in the lowest decile of the distribution in 1975 were still in the same decile in 1988 and the proportion rose to 60 per cent for the bottom fifth of the distribution. Burkhauser et al. (1997) find that the US has a relatively higher level of inequality averaged over many years than the EU countries. For the US, cf. also Carrington and Fallick (2001).

The increase in "non-standard" patterns of employment, with low pay and fewer positive and negative rights[5], has increased the dualism between internal and external markets. There is however no agreement on the factors that are at the basis of segmentation: labour economists blame labour market institutions that, by hampering flexibility, are said to cause segmentation, while, building upon the same theoretical premises, the human capital theory traces segregation back to the nature of technological change, which separates the skilled from the unskilled. These explanations are countered by the classic theory of labour market segmentation, that traces the division of the labour market into primary and secondary markets back to the interplay of social, institutional and technological factors. Which explanation is preferred, determines which policy measures are advocated.

2. The human capital explanation: increasing inequality as a reflection of efficiency

The most popular explanation of the increase in wage inequality explains rising wage differentials with shifts in relative demand for different skill groups. The explanation is based on the assumption that a worker's wage measures his marginal productivity, that productivity is dependent upon skill, and that skill can be measured by education. Since the returns to skill (as measured by education) have increased, it is argued that the demand for skilled labour has outgrown the increase in supply, while the fall in the demand for unskilled labour has exceeded the decrease in supply. Increasing earnings inequality is thus traced back to skill mismatch. It is argued, moreover, that where labour market institutions have constrained the adjustment of relative wages, the mismatch has resulted in an increase in unemployment: this implies the existence of a trade-off between equality and unemployment.

Changes in demand for skill can arise from different, non-mutually exclusive, sources: skill-biased technological change, international trade with low-cost countries, shifts in product demand and the process of restructuring, outsourcing and (domestic and international) de-localisation are the most cited. Among these, skill-biased technical change came to dominate. This explanation assumes complementarity between investment in new technologies and skilled labour, so that the diffusion of information technology is taken to account for the acceleration in the rate of growth of demand for skill. To test this hypothesis, one has to analyse the relation between measures of technical change (for instance R&D and the share of computer in total investment) and the various measures of skill intensity.

[5] Mayhew (2000, p. 5) defines "negative rights as those which protect the worker from abuse by his or her employer – for example unfair dismissal provisions. Positive rights are more concerned with the ability to have an effective say in the decisions of the organisation which employs you and the right to take action to enforce these rights".

The first step consists in ascertaining what happened to the demand for skills. This poses the preliminary problem of how to define or measure skills. Many empirical studies have used education as a proxy for skill or, by equating wage and skill levels, have looked directly at the percentile distribution of earnings. Others have relied upon the production/non-production distinction, while still others have looked at the structure of occupations and jobs at different levels of aggregation.

The overall shift in demand for skills can be distinguished in two effects: part of the demand shift can be generated by changes in the composition of the industrial structure, while another part is to be ascribed to within-sector skill upgrading. Analysis of between- and within-industry shifts in relative demand for skills has been applied to discriminate among the various causes (Katz and Autor 1999, p.1525). Sector differences in productivity growth and shifts in product demand across industries –originating either from domestic sources or from international trade - can account for between-industry shifts in relative labour demand. On the other hand, skill-biased technological change and changes in outsourcing activity are connected with within-industry shifts[6]. According to Katz and Autor (1999) there is evidence in favour of strong between-industry and between-occupation demand shifts favouring more educated and high-wage workers[7]. But these shifts turn out to be much smaller than the growth of the relative supply of more educated workers, so that there is room for a substantial within-industry and within-occupation demand shift favouring the more educated workers[8]. Several studies have tried to measure the within-industry change in skill composition, and correlate it to some measure of technical change (computer investments, the growth of computer use, R&D expenditures, utilisation of scientists and engineers, changes in capital intensity measures), but there is no unanimous interpretation of the evidence. Howell (1999, p. 35), concludes his review of the empirical evidence of a change in skill composition by observing that "neither aggregate measures nor case studies have produced unambiguous evidence of a profound shift in workplace skill requirements". In particular, whatever proxy is used, much of the change is concentrated in the 1979-82 period[9], with little change in skill compositions occurring thereafter. This poses a serious problem of "timing" for the technological hypothesis: how should one evaluate the correlation between change in skill composition and computerisation, and argue in

[6] These two effects cannot be so neatly distinguished, however: in fact, outsourcing of stages of production led to the reshuffling of employment among sectors, as in the case of service operations previously performed within the firms, thus appearing as a between-industry effect.

[7] Increase in demand for each skill group is given by the increase in total employment in each industry weighted by the industry share of the skill group in total supply of that skill.

[8] One alternative explanation is that the data are too aggregate, so that what is classified as within-industry could reflect product demand shifts between more disaggregated industries.

[9] Howell shows that between 1979 and 1982 the non-production share in the durable goods industries rose by almost 6 percentage points. As for occupations, after 1982, only low-skill white-collar workers saw a big decline in total manufacturing employment, while no large decline in low-skill workers is evident in services (Howell 1995, pp. 30-31).

favour of an effect of computerisation on skills and hence on wage differential, if the collapse in the real earnings of the least skilled occurred before the technological revolution could exert its full effects on skill demand[10]?

The explanation of growing earnings inequality based on the hypothesis of a skill mismatch fails the test of empirical evidence on several grounds. First of all it has met with the general problem faced by explanations of wage differentials focused on workers characteristics. In fact, observable job characteristics (such as skill, education, experience) can account for only about one third of the overall change in wage inequality. Most of the change occurs within groups of homogeneous workers, and is thus left unexplained (Katz and Autor 1999). Second, evidence on aggregate trends in supply and demand for skills do not support the claim of a skill mismatch. Evidence for the US, for instance, indicates that demand for skills did not accelerate in the 1980s and 1990s[11], while low-pay jobs have all but disappeared. Third, there is the problem of timing: in the US, most of the increase in wage inequality occurred in the 1979-82 crisis, well before the technological revolution could exert its effects on the demand for skill. Last but not least, international comparisons trying to find evidence on the existence of a trade off between wage inequality and unemployment have met with failure (cf. Howell 1999 for a critical review of the empirical literature).

The difficulties encountered by explanations of the rise in inequality based on workers characteristics, (the supply and demand hypothesis), together with increasing awareness of the role played by institutions, has led to the integration of institutional factors into the main model. It is increasingly recognised, in fact, that changes in the institutions regulating the labour market (unionisation, minimum wages, labour laws) are among the factors which contributed most to the rise in inequality in the US (Gottschalk and Smeeding 1997, Fortin and Lemieux, 1997[12]), in the UK (Machin 1997) and in several other countries over the last few decades (Katz and Autor 1999). In spite of their attempt to enrich the basic supply and demand framework with institutional features, however, the way these models deal with institutions does not substantially change their basic premises. In fact, the effects of institutional changes are considered complementary to the supply and demand explanation, when not even themselves a reflection of changes in the market

[10] Cf. Gottschalk and Smeeding (1997, p. 649) and Howell (1999, p. 41).

[11] Attempts to reconcile the evidence of a steady growth in demand with the increase in earnings differentials had to resort either on declines in supply for skilled labour (e.g a decline in college graduate supply in the 1980s) or to a deceleration in demand due to the fact that as technologies diffuse and become routinized the comparative advantage of the highly skilled declines (Katz and Autor, 1999, p. 1534-5).

[12] Fortin and Lemieux (1997) estimate that about one-third of the increase in inequality in the US in the 1980s can be explained by changes in three institutional factors: de-unionisation, economic de-regulation and erosion of the real value of the minimum wage.

forces[13]. By assuming that the change in institutions derives solely from agents' response to changing incentives, this approach neglects the dynamic interaction of institutions with technology. In a richer picture, in which this interaction is allowed to operate, institutional factors will contribute to shape incentives, thus affecting how technical change impacts on work organisation and the demand for and the content of skills. It follows that no generalisation can be attempted starting from purely technological premises, since institutional differentiation will result in different responses to change, thus leading to a variety of productive systems.

This same criticism applies to that stream of research which has extended analysis at the plant level, trying to explain changes in cross-plant dispersion in wages in terms of differential adoption of new technologies[14]. Since plants differ in the timing and path of adoption of new technologies, this should lead to greater dispersion of productivity and wages across establishments. The theoretical structure for the empirical analysis is based on very specific assumptions on the effects of technological innovation (cf. Caselli 1999). Technology completely segregates workers by skill across plants. Complementarity between tasks within the plant favours self-matching, so that the within-firm skill structure tends to become more homogeneous, accounting for the decrease in wage dispersion *within* plants[15]. Cross-plant differences in technology investment imply differences in the *mix* of workers, in productivity and in wages across plants. Building upon previous empirical findings, Dunne, Foster, Haltiwanger and Troske (2000) conclude that changes in dispersion in both productivity and wages are closely linked, occur mainly across establishment within industries and are linked to differential rates of technological adoption - i.e., computer investment and capital intensity - across establishments[16].

The finding that the increase in wage (and productivity) dispersion has occurred mainly between plants within industries is taken as evidence against explanations based on shifts in the composition of product demand, although it is acknowledged that the level of aggregation might matter. Moreover, the positive correlation between changes in wages and productivity dispersion has been interpreted as evidence against explanations of the increase in wage inequality based on changes in institutional factors, such as union decline and changes in pay norms. It should be noted, however, that plant-level analysis has not solved the problem of "timing": as the authors note, wage

[13] Acemoglu et al. (2001), for instance, suggest that, by undermining the solidarity between skilled and unskilled workers and weakening skilled workers' incentives to join the union, skill-biased technical change is at the root of de-unionisation as well as the rise in inequality.

[14] These studies combine Census surveys on population (which provide data on employees) with establishment level data.

[15] In the US, the correlation between wages of production workers in the same manufacturing plant rose from 0.76 in 1975 to 0.80 in 1986 (Kremer and Maskin 1996, p.1). Dunne et al. (2000, p. 11-12) note however that there has been an increase in the gap between production and non production wages within plants.

dispersion starts to increase steadily since 1979, while productivity dispersion increases only after the 1980s recession (Dunne et al. 2000, p 14).

In conclusion, explanations of rising wage inequalities based upon the human capital theory have thus converged towards the idea of the segmentation of labour markets which had been developed in the '80s (Doeringer and Piore 1971, Piore and Sabel 1984, Wilkinson 1981, Villa 1984). But, according to this approach, the segmentation of labour, and the ensuing polarisation of incomes, are a consequence of the efficient re-allocation of resources (particularly human capital) in the face of a radically changing technology. The human capital explanation draws two strong conclusions: the increase in the demand for skilled labour and the polarisation of skills are the (inevitable) consequence of technical change, and the widening wage differential is the efficient, market response to changes in relative supply and demand for skills and polarisation of productivity. The implication is that there is a trade off between equality and unemployment: societies that chose a more cohesive income distribution have to be prepared to accept higher unemployment and lower overall efficiency.

3. Labour market segmentation

The change in earnings distribution can be explained starting from a radically different theory of wages and the functioning of the labour market. In the classical tradition institutional and customary elements play a central role in explanation of the normal or 'natural' wage. In fact, "they determine to a considerable extent the *present* bargaining position of the groups involved, while at the same time expressing the *past* bargaining position of those same groups (Garegnani 1990, p. 118). In his reappraisal of the classical theory of wages, Sraffa considers "the wage as normally composed of two parts, cost and surplus" (cf. Pivetti 1999, p.282). The former, what Sraffa calls "the efficiency level" of the wage "corresponds to the price which is necessary to pay to carry on the productive process without too much discontent and conflict in the working place" (*ibid.*, p. 281). This element of costs is the same thing as "the necessary subsistence" of the worker – which never meant "physiological necessity" – and sets the minimum level below which wages cannot fall under normal competitive conditions. The bargaining position of the workers determines the division of the surplus, and "accounts for the changes of subsistence over time"[17].

[16] "A large fraction of the increase in productivity dispersion is associated with increases in the productivity differential across high and low computer investment per worker plants and across high and low capital intensity plant." (Dunne et al., 2000, p.29).

[17] "In any given social and historical context, a persistently positive and growing level of the surplus part of the wage must eventually raise also its cost part, since when a level has been in force for a certain time 'it becomes necessary', as Sraffa points out, 'if one wants the result'. Conversely, when social and historical conditions are such that they result in a negative *net* wage, then the cost component itself may in the end be persistently squeezed up, and conveniences that were 'subsistence' at an earlier period may eventually become 'luxuries'" (Pivetti, 1999, p. 282).

The Keynesian and institutionalist schools took up the classical approach in that the determination of wage and the level of employment are kept separate, so that there is no systematic relation between the real wage and the employment level. While the Keynesian approach focused on factors regulating the volume of employment, institutionalists tried to explain the economic, technological and institutional factors shaping the structure of the labour market. The institutionalists took up the idea of "non-competing groups" which had been advanced by John Stuart Mill and Cairnes[18]. The latter describes the labour market as divided into horizontal strata (or grades). Social differences determine the allocation of workers to the different grades. Workers can compete within each grade but are precluded entry to different socio-economic grades. Wage inequalities are thus traced back to differences in the social structure. On the other hand, social, historical, institutional and technological factors shape the behaviour of the labour market. The establishment of formal or informal rules results in the "balkanization" of markets (Kerr 1954) along a vertical segmentation focused on the enterprise, and makes the notion of a "competitive wage structure" meaningless. The complexity of the wage-employment nexus makes supply and demand conditions irrelevant for the determination of relative wages and the allocation of labour[19]. Since there is no mechanism guaranteeing that labour will be paid according to marginal productivity, this leaves a range of indeterminacy in wage setting (Lester 1952). Within this range, changes in wages will leave the demand for labour unaffected[20].

The idea of a "structured labour market", as made up by a set of markets, differentiated in their working process and in their outcomes, is taken up by the Labour Market Segmentation (LMS) approach. The explanation of how the different structures are shaped and interact requires a multi-causal approach, in which various factors interplay. The essential features of the segmentation approach have been nicely illustrated by Villa (1986), who identifies four levels of analysis: the social reproduction of the labour force, the determination of employment opportunities, the allocation of workers to jobs available, and the transformation of labour power into labour[21]. The

[18] J.S. Mill, *Principles of Political Economy*, 3rd edition, 1852, II; Cairnes, J.E., *Some Leading Principles of Political Economy Newly Expanded*, London 1874.

[19] As argued by Reynolds (1951, p. 263) the market cannot tell how much should be the wage of a miner relative to a weaver or a bricklayer. Cf. Zenezini (1997, p. 358).

[20] The institutionalist approach has been taken up recently by Howell and Huebler (2001). According to the authors, in each segment of the labour market wage setting occurs within a range whose boundaries are defined by a highly inelastic and imperfectly known marginal productivity band, a reservation wage (determined by social norms and the amount of labour surplus), and the technologically determined minimum employment level. Within this range of indeterminacy, wage setting will respond to consideration of fairness and morale. An idea of a range of wages is also implicit in the recent literature which, dropping the assumption of perfect competition, explains inter-industry wage differentials with rent-sharing between firms and workers. Cf. Blanchflower et al. (1996).

[21] The neoclassical explanation of segmentation and the existence of internal labour markets is that they represent an efficiency response to uncertainty, imperfect information and externalities inherent in the employment relationship (in particular those created by job-specific training), that foreclose atomistic market solutions (cf. Taubman and Wachter, 1986). Yet, as convincingly argued by Bettio (1988, p. 26-27), "imperfect competition misses the point in the case of

system of social reproduction (both family and class structures) and institutional factors (legal regulations, trade union organisation, ideology) define the labour force both in quantitative terms and in terms of their economic and social position in the social structure[22]. The level of demand and its composition by sector determines the structure of employment, that is, jobs available by sector. Economic, technological and institutional factors will shape the characteristics of the jobs available (technology, development and organisation of skills, promotion, dismissal) and thus the structure of the labour market. These factors, together with employers' labour policies, will define the worker characteristics which – in terms of skills, educational attainment, age, behavioural patterns – will best fit the jobs at hand. "Interaction between the job opportunities in the labour market available for each group of workers and supply of labour in terms of work characteristics (taking into account workers' terms of acceptance of the working conditions, i.e., their bargaining power[23]), define the workers' position in the labour market". In this approach, wage rates are determined by the job, and not by individual characteristics. It follows that "in order to explain how workers are paid it is crucial to explain possible differences in access to jobs" (Villa 1986, pp. 257-58). Changes in wage inequality can be better explained by analysing changes in the characteristics of jobs and in the access to jobs, rather than changes in the characteristics of individual workers. This requires a reconsideration of the notion of skill.

4. The concept of skill

The concept of skill represents a crucial point which differentiates the human capital and the LMS theories, and affects their different explanation of income distribution. This section will deal with two related questions: 1) the effect of the social context on the process of acquisition,

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the labour market: the unresolved issue is that the power conflict involved in the control over the labour process remains, whatever the clauses of the labour contract and the allocative mechanisms (i.e. internal versus external labour markets)…The nature of the labour contract and the need to control the labour process give rise to an underlying conflict of interest at the work-place". In internal labour markets the procedures relating to the control over the labour process (pricing, allocation, promotion and dismissal) are institutionalised. "They can also be implicit, as when rules are within the discretion of employers… [These procedures] are internal to all firms because allocative problems are intimately connected with the problem of control, and no market or market substitute alone can solve them".

[22] See Rubery & Wilkinson (1981, p. 127): "The wage levels at which non-competing groups are available for wage work are related to their relative opportunities in the wage labour market and their position in the social structure, and do not reflect their relative productivities".

[23] Workers' position within the social structure determines their acceptance of jobs in the secondary market. The state, by affecting family incomes and legal structures, "can exert a control on the supply of labour, particularly the supply of low-paid labour… Women, men, old people, juveniles, immigrants, and ethnic minorities differ substantially, not so much in terms of skills, education, and physical conditions, but with respect to the position they occupy in the labour market" (Villa 1986, p. 261). "As a result of a) differences in the system of social reproduction, in terms of both social structure and family structure, and b) social and institutional forces reinforcing existing differences, some social groups are constructed as crucially weaker sections of the labour market… thus affecting their social bargaining power, that is, their willingness and ability to accept jobs at certain wages and in certain working conditions" (ibid., p. 263). Cf. also Bettio (1988) and Picchio (1992).

progression or destruction of skills; and 2) the effect of the institutional setting on firms' skill policies.

Human capital theory conceives of skill "as unitary, measurable traits that individuals possess and are able to transfer from one context to another" (Stasz 2001, p. 397). In this approach, skill is considered as a choice variable: each worker can choose how much to invest in education and training, by forgoing present income and consumption, determining in this way the amount of his/her skills. Although it is recognised that other factors, besides education, may affect skill, the assumption of a strong correlation between academic and other skills, based on the idea that technical practice relies heavily on theoretical or abstract knowledge, has justified the widespread use of education as a proxy for skill. Thus, evidence of increasing returns to education in the '80s and 90s has been taken to support the hypothesis of an excess demand for skill on the basis of the chain relations: education-skill-productivity-wage.

There are conceptual and empirical problems with this approach. Some of the problems concerning the measurement of education and the possibility to use education as a proxy for the demand for skill have already been mentioned in section 2. For instance, demand and supply for skill may not be independent, so that demand may adapt to the upgrading of supply, with no substantial changes in tasks. More generally, the labour market may not utilise all the available skills: if mismatch of qualifications with jobs leads to over-education, to infer the demand for skilled labour from workforce education may lead to serious overestimation, while estimates of the return to education will be distorted[24]. The problem of a different meaning of schooling across countries and in time has led to the use of alternative measures, such as literacy tests, for the purpose of international comparison. More basic problems derive from the fact that skill acquisition continues after school, and not only through formal training. As already stressed by Mincer (1958), the process of valorisation of human capital differs across jobs, in that it may determine a cumulative appreciation of skills in some jobs (through continuous on-the-job training and experience), and de-valorisation in others. It follows that the individual characteristics of the workforce, as proxied for instance by education, cannot take account of the differential potentialities in career progression and actual skills. The same investment in education can lead to different 'amount' and quality of skills according to industry, job and occupation, and their market

[24] There is evidence that in many occupations an increasing share of college graduates are hired to perform substantially the same tasks, and with the same pay, which were previously carried out by high-school graduates (cf. Cappelli et al. 1997, p. 155-6). As noted by Howell et al. (1999), this poses problems for the use of education as a proxy for skill over a period characterised by shifts across educational and occupational groups, besides affecting the estimate of return to education.

values may differ accordingly[25]. Acknowledgement of these problems has led to inclusion of other indicators (such as experience, seniority, industry or occupation) in the estimation of the return to skill[26]. When workers' skills have been measured by different indicators, however, results have turned out not robust to different measurement methods. These different measures, in fact, do not tackle the main problem with this conception of skill, that is, its "exogeneity" with reference to the social context.

The institutional school stresses a broader definition of human capital, based upon the concept of skill as a social outcome: far from being simply a technical feature, skill has a social dimension (Bettio 1988). The focus of analysis is thus shifted from the individual to the social setting. The difference in approach reflects the different meaning attached to knowledge: in the human capital approach knowledge is considered as information that can be readily absorbed, in the institutional view, which takes up the competence based theory of the firm, on the contrary, information can only be used effectively if embodied within the knowledge system of the firm. The notion of competence refers therefore to the shared knowledge of the organisation, "which is embodied in the routines and procedures which co-ordinate the joint activities of members and enable them effectively to communicate and work with each other (Wilkinson and Moore 2000, p. 232). The firm plays a crucial role in organising the interdependent capabilities of its members. It follows that learning in a firm (and hence the development of know how, skills and competencies) is not a mere individual experience. The importance of the social dimension makes it difficult to evaluate individual skills out of the social context; this limits the firm-to-firm transferability of skills, and makes problematic the development of a market for skills (cf. Guidetti 2000).

While the organisational structure of the firm governs the pattern of skill development, it is affected, in its turn, by different kinds of institutions and organisations. Market economies differ significantly in the ways that economic activities are co-ordinated and controlled. As argued by Whitley (2000), these differences lead to different kinds of firms, in terms of their governance

[25] This is recognised in theoretical analysis, though often neglected in empirical research. Cf. Taubman & Wachter (1986, p. 1199-1200): "human capital theory does not suggest that all types or levels of schooling yield age-earnings profiles with the same slope. In fact, it very clearly argues the reverse. Some occupations can be expected to have distinctively flatter profiles than others. Specifically, the human capital model is compatible with individuals 'choosing' experience-earnings profile that are perfectly flat or upwardly sloped. The observation that some individuals have flat experience-earnings profiles thus contains no information on the rate of return to education or training that is available to those individuals." Once again, the deployment of workers between skilled or unskilled jobs (or between "good" and "bad" jobs) is made dependent on individual decision to invest in formal education and other skill training programs, or on the workers' propensity to endure short-run costs in order to invest for higher benefits, as if they had an inherent capability of making themselves employable.

[26] Occupational category also presents problems, if it does not capture transformations of jobs within existing definitions Comparing the UK's SOC90 and SOC2000 occupational classification, for instance, "many managerial occupations formerly classified as high skill are demoted" (Borghans et al. p. 381, quoting the study by Elias and McKnight). Cappelli et al. (1997) has documented the different effects of the introduction of the information technology

structures and organisational capabilities, thus affecting their different ways of dealing with innovation and technical change. It follows that similar kinds of technologies are developed differently in different environments. For instance, highly collaborative societies tend to encourage continuing, incremental innovations that build on existing organisational capacities, both within and between enterprises. "Adversarial, arms' length societies, in contrast, generate greater discontinuities between skills and routines, with more radical restructuring of technological competencies" (Whitley, 2000, p. 881). It follows that – contrary to the idea that technology and work organisation will develop in one direction that is common for all industries and occupations, so that there will be only one dominant tendency in the development of the labour process - innovation patterns and technical change can take a variety of forms in different circumstances. Different productive systems determine different outcomes in terms of the quality of jobs which are available, and therefore the kind of skill demanded, the process regulating skill development (up-skilling, de-skilling and the degree of polarisation in skills), the rules governing allocation of workers to jobs and, ultimately, the structure of earnings which will prevail in a country.

The literature on this point is rapidly growing and empirical studies on the different effects of high-tech innovation on skills in different institutional settings are now available. Two polar examples of productive systems have been singled out, with reference to industrial relations[27]: Germany - where a tradition of long-term, trust relations, between employer and employees and among firms, prevails – and the US – where short-term, market relations predominate. Casper (2000) argues that these two archetypal models have different implications for the kind of skills that will be developed and for the system of rewards. In Germany industrial relations and labour laws make it difficult for firms to lay-off individual employees or groups of employees as part of the 'normal' course of business[28]. This limits job mobility across firms, especially if many employees over the years invest in firm-specific skills and long-term tacit knowledge. One result of long-term employment is thus that, while it minimises competence destruction by favouring skill preserving and competence building, it restricts the creation of an active labour market for skilled workers.

In the US, conversely, firms are free to adjust labour through hiring and firing, as circumstances within the firm develop. It follows that the organisation of career paths within firms

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(and computers) on skills of workers employed in secretarial work, with some experiencing up-skilling and other de-skilling.

[27] This roughly corresponds to Pagano's proposed taxonomy of labour allocation systems based on employees' rights. Cf. Pagano 1997. The main relations can be summarised as follows:

1. organisational rights → lasting employment relation → functional flexibility → on the job training and firm specific skills.
2. Occupational rights → right to specific job → numerical flexibility → preference for general skills.

[28] Large German firms have other options open: they can for instance close entire subsidiaries or business units or send lower productivity older employees into early retirement.

is based on the probability of frequent employee turnover[29]. High skilled workers are more responsive to short-term incentive contracting arrangements, thus feeding an extremely flexible labour market. "Active labour markets facilitate rapid asset recycling to compensate for competency destruction within technology firms" (Casper, 2000, p. 904). The American model, which relies on external flexibility - firing and hiring workers whenever organisational or technical change require a change in the skill mix - can only be viable if the organisation of production requires either highly specialised tasks with off-the-job training or jobs characterised by a minimum amount of on the job training (cf. Guidetti 2000). It relies, moreover, on the capability of the market to provide the quality and the quantity of skills that are demanded. On the other hand, a model based on long-term relations, which favours the promotion of workers from the bottom end of the occupational or skill structure up to some higher layers, can trust on firms' capability to produce the required skills[30].

It should be stressed that this is an extreme simplification. Technological and product market conditions affect employers' reliance on internal or external markets, so that more than one pattern of innovation can be found within the same country. In the US, in fact, firms' response to changes in technology, regulation, and competition has given rise to a variety of new organisational forms. In spite of the richness of attempts, however, a dichotomy seems to have emerged in US labour-management relations, with more co-operative[31] and increasingly adversarial approaches being used (Birecree et al. 1997). Conversely, Casper (2000) suggests that German firms have embraced new technologies (e.g. software services and biotechnology) while preserving organisational structures that do not disrupt the competencies of their human resources. It is plausible that the higher average level of skills of German workers, integrated into an organisational framework capable to promote their advancement, can sustain higher productivity and a narrow dispersion of earnings.

5. Growing inequality and restructuring

An alternative explanation of the increase in earnings differentials in the US can thus be advanced, one which takes into account the central role played by institutions not only in protecting low-pay marginal workers employed in bad jobs, but in creating the framework within which technical change operates, thus affecting the quality of the jobs available.

[29] In the US, firms expect "skilled employees to commit themselves to the very intense working conditions needed to win the competitive race, but they also reserve the right to hire and fire at will. This incentive conflict is reduced by offering very high-powered short-term performance incentives to employees" (Casper 2000).
[30] This can prove problematic in case of radical innovations that require new knowledge and skills that are far apart from the ones developed within the firm's innovation system.
[31] Cf. Appelbaum and Batt (1994) for analysis of adoption of 'high-performance' work systems by American firms.

Up to the 1970s, internal labour markets[32] met the internal productive requirements of the firm, given the particular external conditions that shaped the social and institutional norms regulating the "natural" wage and its structure. Several factors - the change in macroeconomic conditions, the sharpening of (domestic and foreign) competition, labour saving technological change - have interacted with a more general change in 'ideology' to produce a radical change of context.

In the US, firms have responded to the intensified pressure of competition, and in particular to the 1979-82 crisis, with a profound industrial and organisational restructuring, obtained by resorting to de-localisation, outsourcing, and temporary work. The pattern of restructuring, the change in work organisation within the firm, and changes in social and institutional norms[33] have been mutually reinforcing. Employers' strategies have shifted the boundaries of labour market segmentation. The secondary market has expanded, while some of the characteristics of internal labour markets have been eroded (cf. Grimshaw et al. 1999): outsourcing and resorting to temporary jobs have undermined the "job for life"; flatter organisation has reshaped the traditional reward system; industrial restructuring, obtained through outsourcing, downsizing, and delocalisation, has destroyed the "good jobs", paying high wages, and created a large number of low-wage jobs in their place. For many of the out-sourced jobs, however, it is not much the skill content that has changed, but the characteristics of jobs and the wage attached to these jobs[34]. Since these changes have affected primarily the bottom of the skill ladder, their change can better explain the collapse of lower wages, and its concentration in the recession period (Howell 1999).

The information technology is a relatively more recent phenomenon, that came to be superimposed on an already sharply diverging income distribution. Combined with changes in work organisation biased in favour of out-sourcing of labour intensive or low-skilled tasks and operations, information technology might have strengthened the process towards 'segregation' and de-skilling, with sharp reduction in job security and worsening conditions for the workers affected. Has observed in Cappelli et al. (1997, p. 9) this change in work organisation is at the heart of a contradiction of the US productive system: while the changes in organisational practices induced by new technologies require greater involvement and delegate greater decision-making authority to the

[32] "The term 'internal labor market' refers to the set of rules and institution that govern the allocation and pricing of labour within the firm (Doeringer and Piore 1971).

[33] As noted by Mitchell (1985, 589-90) "The political and legal climate change has been reflected in a greater willingness of management to take actions in labor disputes that might not have been publicly or politically acceptable in the past…Even firms with a long history of unionization are using nonunion labor".

[34] "Industries with high-wage, low skill workforces appear to have restructured (mainly in the early 1980s) by radically lowering wages and gradually raising skill requirements ...Wage concessions, the outsourcing of parts, relocation of operations to low-wage sites, the substitution of contingent for permanent workers, and other employer policies aimed at reducing labour costs all have had substantial effects on relative wage trends in the 1980s. But they did not have major consequences for the skill-mix." (Howell 1995, pp. 33-34). See also Cormier and Craypo (2000).

shop floor[35], thus calling for greater job security and training, the trend in employment relations have gone in the opposite direction. As argued above, this poses a heavy burden on the market to provide an adequate supply of skills: in the long-run the free-riding behaviour of firms might result in an under-investment in skills from a social perspective.

This conclusion is supported by a critical analysis of the results of comparative studies on wage and skill differentials. Empirical evidence that the distribution of both earnings and cognitive skills vary widely among countries had suggested the possibility that the wider dispersion of wages could be explained by the wider dispersion in skills (Nickell and Bell, 1996)[36]. Subsequent analysis (Freeman and Schettkat, 2000 for a US- Germany comparison and Devroye and Freeman, 2001 for a larger group of countries) has found that institutional differences are more important than skill dispersion in explaining wage inequality across countries. In particular, Devroye and Freeman (2001) find a strong cross-country relation between skill inequality and earnings inequality, but much weaker links between measured skills and earnings within countries. This divergence can be explained, along the lines that have been suggested here, by introducing institutions as the crucial factor in the explanation of *both* wages and skill dispersion[37]. Besides playing a central role in determining, through firms' policies, the nature and dispersion of skills, welfare state institutions may affect the average level and diffusion of cognitive skills, through education and training (Howell and Huebler, 2001). The skill-productivity-wage nexus, integrated within the social and institutional setting, can thus provide an explanation for cross-country differentials in wage inequality: productive systems which differ in their capacity to enhance and preserve competencies and skills will result in differences in wage inequality.

Conclusions

Technological change does require increasing cognitive skills, and the technological hypothesis has been right in emphasising the importance of the information revolution. Yet, by searching for one dominant tendency in the development of the labour process, it has assumed that technology and work organisation will develop in one direction, independent of the social context. Combined with the supply and demand determination of wages, this has provided an explanation of the increased earnings dispersion based on a differentiated growth of the demand for skills. Empirical

[35] Cf. also the Economic Report of the President (2001, p. 126): "There is evidence that in the last 10 years more firms have placed greater decisionmaking authority in the hands of the average employee. The growth of processes to increase employee involvement and the delegation of decisionmaking to the shopfloor, for example through off-line problem-solving teams or self-directed work teams, indicate how line employees are performing functions that used to be retained as management prerogatives".

[36] This conclusion is challenged by Freeman and Schettkat (2000) who find that, even after adjusting for the German narrower distribution of skills, wage distribution in Germany is still more compressed than in the US.

research could not find evidence of an acceleration in the demand for highly skilled workers in the last two decades, while low-wage jobs have all but disappeared. While the recent technological change may have had a great impact at the top, and thus explain the increase in high-skill wages, the collapse of low wages has more to do with changes in the social and institutional context.

It has been argued in the paper that the role played by institutions should not be interpreted as limited to govern labour conditions within a *given* structure of jobs. In fact, the dynamic interaction between social institutions, organisational patterns, social norms affects the valorisation of knowledge, the dynamic interaction between primary and secondary markets, and hence the structure of jobs, together with what society considers a 'fair' wage.

The clear inversion in the trend towards greater egalitarianism in earnings distribution recorded in the period around the two World Wars has been paralleled by an inversion in workers' positive and negative rights, that reached their apogee in the 1970s and early 1980s (Mayhew 2000). The change has varied across countries and has involved a change in attitudes and practices, in norms of fairness before than (or besides) changes in legislation.

In the US, the economic crisis seems to have been instrumental in triggering off the inversion in attitude (acceptance) of new norms on fair wages and earnings inequality, a change that the following expansion has been unable to reverse. At the same time, a deregulated institutional environment has removed the threshold to wage cutting. Unregulated competition has pushed firms in a sort of low-wage spiral, fuelled by the large numbers of disadvantaged workers deprived of sufficient institutional protection to offset their vulnerability (Craypo 2000, p. 37). The fall in the "surplus" part of the wage has affected mostly the low paid jobs, and it has been persistent enough to dent the "cost" (or subsistence) part of the wage, as evidenced by the increasing number of working poors. Only in the late'90s high and persistent growth and tight labour markets, supported by legislated changes in the legal minimum wage[38], have led to a decline in non standard work arrangements, an increase in the share of regular workers, a substantial decline in unemployment also for workers at the bottom[39], and, eventually, a rise in real wages for low pay workers, after more than 15 years of stagnation and decline.

In continental Europe institutions have been more effective in reducing wage and income inequality. However, the long debate on labour market flexibility, together with the pre-eminence

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[37] Cf. Estevez-Abe et al. (2000) who argue that "earnings dispersion is closely related to particular skill systems as well as the wage bargaining institutions that tend to go with these systems".

[38] Legislated changes in the legal minimum wage occurred in 1990, 1991, 1996 and 1997. In spite of these increases, in 2000 the real minimum wage was still more than 20% below its value in 1979, while the real wage of production workers are still below their level in 1979 (Appelbaum, 2001, p. 12).

[39] Unemployment rates:

	Total	Male	Female	White	Black	Hispanic
1992	7,4	7,0	6,3	6,5	14,1	11,4
1999	4,2	4,1	4,3	3,7	8,0	6,4

among economists and policy-makers of the view that asserts the existence of a trade-off between efficiency and equity (in spite of scant empirical evidence[40]), has contributed to influence the average opinion, thus paving the way to reforms that reduce the protection, and hence the bargaining power, of potentially weaker workers. The expansion of the secondary market, in turn, puts pressure on the primary market, undermining the rights of the more secure workers. As in the US, a deep crisis can be instrumental in speeding up both the process of restructuring of the labour market in the direction of a greater precariousness of job positions, and its social legitimation[41].

The effects of these policies on income distribution are becoming manifest in Europe too, as we showed in the first section, rising concern about job quality, labour market segmentation and social exclusion. Starting from the premise of an unlimited demand for labour, conditional on wage, and an unlimited access to good jobs, conditional to appropriate skills, the solutions that are suggested within the human capital approach focus on improving individual employability (formal education, permanent training programs). These policies, however, can help individual workers' exit out of unemployment, but cannot solve the aggregation fallacy. If the total number of good jobs is given by the structure of effective demand and by employers' strategies, spending in education and training will not be sufficient to reverse the trend of increased inequality. Moreover, if skill is acquired mainly on the job, contingent work does not favour competencies building, but will only increase the probability to get stuck into dead-end jobs. Thus, policies that operate only on individual employability are doomed to fail if they are not supported by policies acting on the structure of jobs available. If anything, the problems of labour market segmentation and social exclusion have been aggravated by the labour policies which have been pursued. The main conclusion, however, is that the problems concerning the structure of the labour market cannot be tackled only with labour policies, but, as argued by the LMS theory, they require policies that affect both the amount and the characteristics of jobs: macroeconomic policies that sustain the overall level of demand, supporting institutions that help firms in choosing capability-enhancing organisations of production and labour relations, and institutions that protect disadvantaged workers preventing the collapse of their wages below the poverty level.

Source: Mishel et al. 2001 (quoted in Appelbaum 2001).

[40] Research attempting to estimate the efficiency effects of different labour market institutions and social policies could not identify a "best" set of institutions. Freeman (2000), for instance, argues that "labour market institutions have large effects on distribution, but modest hard-to-uncover effects on efficiency".

[41] In Italy, the tendency towards wage compression (which had been strengthened in the '80s by the operation of the wage indexation mechanism) is abruptly reversed between 1991 and 1993. Brandolini et al. (2000) suggest that the political and economic crisis which followed the 1992 devaluation (with a record fall in employment) may account for the change in climate which has paved the way to institutional changes and re-organisation of production that unleashed a decompression of the wage structure.

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