

INEQUALITIES AND THE FUTURE OF WORK: *PIKETTY AND BEYOND*

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The last three decades have seen a strong increase in inequality of income and wealth. This increase is broad based, taking place in advanced and emerging economies. Global indicators show a reduction in worldwide inequality. However, this result has been achieved through economic convergence between emerging and developed countries as China and other big emerging economies are fast catching up with the advanced world. Inside each and individual country, domestic inequalities have trended up.

Labor share has diminished in all advanced economies. Or, equivalently, real wages have failed to keep up with increases in productivity. In the US, the median wage has stagnated for the last 20 years. The top 1% higher incomes have seen their share increasing from 7.7 % to 17.4 % of the total. 80% of the increase in total wealth has gone to the top 5%. The bottom 80% may have seen a decrease in their net wealth.

This raise of "the 1%" has contributed to Piketty's popularity and success. He developed an intellectual framework where inequalities in wealth and income mutually reinforce each other. This seems to give a vivid and accurate account of what we have seen over the last 30 years.

Piketty's work is first and foremost an extraordinary historical description. It is grounded on thorough research, data mining and processing. It is also a theory. And, based, on that theory, there is a prediction for the XXIst century. Piketty projects a permanent decrease in the labor share, higher capital to GDP ratio and greater concentration of wealth. Together, those three trends lead to a constant increase in income inequality. According to his view, the four decades when inequality went down - from 1945 to 1985 – have been an historical exception. We are now back to the secular dynamic of capitalism, where growing inequality is the norm.

Piketty follows in the tradition of Malthus, Ricardo and Marx, all economists who thought that tensions on income distribution would ultimately lead to the collapse of capitalism. It is easy to understand why this line finds such an echo in the current world environment. Corporate profits are very high. Aggregate demand is low in many countries. Deep interrogations surface about long-term growth dynamics and prospects.

Is Piketty right? Tens of papers have now been published on this question. Let me be slightly provocative in giving my own opinion: I wish Piketty were right. At least, we would have some idea on how to face the problem. If Piketty were right, we would have a debate on income and

¹ this draft : June 2015

wealth redistribution. We at least know the terms. We have the intellectual and philosophical framework to deal with redistribution policies, even when they prove politically corrosive. And, in the last part of his book, Piketty himself offers some brilliant insights.

But, as subsequent discussions have shown, Piketty's predictions rest upon assumptions on the value of some key economic parameters. Most likely, those assumptions will be proven wrong. However, in my view, this is secondary. The problem with Piketty is different. By focusing on capital accumulation as the main driver behind inequalities, we may be missing the real point: in the future, there may be growing inequality between wages rather than between wages and capital income.

If we look beyond Piketty, we see enormous challenges for policymaking. Those challenges come from the impact of technology on income distribution, the nature of work and, ultimately, the fabric of our societies. We may be facing the prospect of a jobless economy with widespread economic insecurity extending to the middle class. And, to devise policy responses, we may have to start from scratch.

In this lecture, I have therefore two purposes. First, take stock on the discussion about Piketty. Positions are now very well established and clearly articulated. I will assume broad facts about inequalities are known and heavily rely upon existing literature. And, second, try and look at the question of potential trend and changes in labor demand in relation with technology and their signification and consequences for public policies.

DISCUSSION ON PIKETTY

what does Piketty say

As the title of his book makes clear, Piketty's work is more than pure history. It purports to predict the trend in inequality over the next decades. And, for doing so, to establish some "fundamental laws" of capitalism.

At the heart of Piketty's vision, lies the famous relationship: $r > g$. Piketty states that, for the XX1st century, the return on capital (r) will stay higher than the growth rate of the economy (g) especially since demographic trends will reduce (g), everything equal. Once we accept this intuition, the reasoning is straightforward. If $r > g$, the capital stock (the wealth) grows faster than the economy. The capital / GDP ratio increases. As long as (r) keeps high enough, the capital share also increases continuously. Growth produces inequality.

Most economists strongly admire Piketty's, work, the extreme elegance in his formulations and the breadth of his vision. Many, however, are not fully comfortable with the assumptions that underpin his conclusions. Critics are focusing on two main arguments.

One is about decreasing returns. This is, indeed, one truly "fundamental" law in economics. As more capital is piled up on each and every unit of output (and labor) its marginal product

decreases and so should its remuneration. So, for each euro of GDP, we have more units of capital, but every additional capital unit brings a lower return. More capital with less return: what is the ultimate outcome for the capital share? This is, basically, an empirical question. It turns out it depends on one specific parameter; the elasticity of substitution between capital and labor. If substitution is easy, (the elasticity is above one) capital can accumulate without losing too much of its efficiency and keep its remuneration. So the capital share does increase. This is Piketty's scenario. Most economists, however, estimate that the elasticity of substitution is well below one (an assertion supported by the majority of existing studies). If they are right, then decreasing returns will ultimately dominate the increase in capital intensity. (r) will not stay above (g) for ever: the capital share will stabilize and diminish².

A second argument relates to the saving behavior. As the stock of capital grows (relative to output), more and more savings are necessary to simply compensate for depreciation of existing capital, let alone increase the net capital stock. At the limit, all additional income should be saved for the wealth (capital) ratio to increase continuously, an obviously impossible situation³.

These are powerful objections, all the more significant as they come from economists generally sympathetic to Piketty's views. Piketty himself has not offered a formal and detailed rebuttal. From some passages of his book and subsequent interviews, one can infer that he would make two counterarguments.

First, he may doubt that the return on capital always equals its marginal product. He's been quoted as saying he does not "believe in the neo classical growth model". That statement echoes some chapters in his book where he looks at various biases and market failures that distort income distribution to the benefit of capital. Many economists would indeed argue that "rents", obtained through monopoly powers or political influence, explain why the capital share of income has continuously increased over the last decades. This is an important argument, but very different from the one originally made by Piketty. We are not talking here about "fundamental " economic laws. We are discussing social and political dynamics that create and perpetuate unfair societies. Those dynamics are not "fundamental": they could, in principle, be altered by appropriate policy initiatives.

Piketty also talks about technical progress. As you are all aware, technical progress is what allows our economies to beat the law of decreasing return. Without technical progress, long-term growth would be impossible. According to Piketty, technical progress is the reason why Marx was proven wrong and capitalism did not collapse under the weight of its own contradictions. However, Piketty stops short of discussing at length the consequences of technology on the distribution of income and growth. For the future, that might be the most important question. And it is the issue I shall now turn to.

² see Rognlie

³ see Summers (2014)

INEQUALITY AND TECHNICAL CHANGE

Inequality shows itself under different guises. One is extreme joblessness. To quote Glaezer, it "may be only one aspect of increased inequality but it is amongst the most troubling features of a more unequal world". Inequality is also closely associated with economic insecurity that unequally affects different parts of the population. Both inequality and insecurity may be a by-product of technological change.

Concerns about the impact of technology on jobs and incomes are nothing new. The luddite movement goes back 200 years ago. Over the last three decades, thousands of pages have been written by economists trying to sort out whether globalization or technical progress is mainly responsible for the increase in inequality. Recently, however, increased automation of tasks and progress in artificial intelligence have injected new intensity and urgency into the debate. There is some sense that the coming wave of technological innovation will prove more disruptive than in the past.

To look deeper into the issue, it is useful to distinguish between the aggregate effect of technological change, on the one hand, and its distributive impact, on the other.

aggregate effect

In aggregate, technological progress has three effects. First, it increases productivity. Second, as a result, prices of goods and services may go down. And third, lower prices will trigger an increase in demand. The overall impact will depend on the interplay between those three effects. We can think of a virtuous circle, where productivity lowers prices, then stimulates demand sufficiently for overall employment to grow (despite the fact that every single unit of output incorporates less labor). For that to happen, the price elasticity of demand must be high enough. This is likely in most cases and, historically, has proven true. But it cannot be taken for granted. For instance, total revenue of the music industry worldwide has gone down by 40% from 2007 to 2013. We certainly have not stopped listening to music and it has become much cheaper and accessible. Piracy may have contributed to some erosion in revenues. But, most likely, the price elasticity is too low. And the increase in paying demand does not compensate for the drop in prices.

The same dynamics drives "deindustrialization", which can be defined as the hollowing out of jobs in most manufacturing activities. In advanced economies, employment in industry had constantly decreased, for many decades, in proportion of the total. Productivity grew faster than demand. We have good reasons to think the gap has recently widened. Starting around 2000, we see a disconnection between productivity and employment growth. This is the first period since 1945 when the two aggregates have not grown in parallel. The phenomenon has been dubbed "the great decoupling". Productivity growing faster than employment may signal a deep change in the nature of technological progress. And that change may severely impact industrial jobs. For the US, L. Summers (2013) notes, strikingly, that the number of people to day employed in direct manufacturing jobs is now smaller than those with disability benefits.

The trend may not be specific to advanced economies. As technology becomes "global", and emerging economies are faced with increased competition, it is possible that some will undergo "premature deindustrialization"⁴. The rhythm of automation will outpace demand growth. The usual process of development - through which jobs and wealth are created in manufacturing activities - would be, so to speak, short circuited. At the moment, there is no sign of premature deindustrialization in Asia but the picture is less clear for Latin America. Should it come, the consequences of premature deindustrialization are hard to anticipate. Manufacturing activities, while often painful and degrading, also carry enormous positive externalities in terms of greater human capital and endogenous technical progress. It is not yet clear whether growth of the service sector can have the same effects.

distributive impact

For inequality, however a second question is key: whether, in the future, technology will act as a complement - or a substitute - to labor. If it's a complement, technical progress will "enhance" labor, it will increase, everything equal, its marginal product, leading to higher wages. On the contrary, if technology substitutes for labor, the demand for labor will fall. Equilibrium wages will drop - possibly to zero- for many activities, leading at least to increased inequality or, in extreme cases, to a total loss of demand for some categories of jobs.

Whether technology is a complement or a substitute to labor is, of course, an empirical question, a matter for observation. And the answer will likely vary, according to different occupations and qualifications and different periods of time. Now, looking at recent trends, and oversimplifying a little bit, we see what can best be described as an extreme polarization of the job market, with a limited number of people gathering huge incomes while the bulk of the population, including qualified workers, see their living standards stagnate. This is a technical description of the "1%" phenomenon.

To some extent, polarization of the job market is nothing new. It has manifested itself over the last three decades as wages between workers with or without a college degree have taken increasing divergent paths. There has been a "race between education and technology" (Goldin and Katz) with technical progress putting an increasing premium on higher education.

This time may be different. Polarization may show with extraordinary intensity with the dividing line crossing *inside* the population of qualified workers. It's possible that current technological progress is becoming increasingly biased. It complements and enhances a very limited number of occupations and increasingly substitutes to the majority of others. So labor demand would be heavily skewed in favor of a small group of people. This would explain why some people work very hard and others are left without jobs.

⁴ Rodrik (2015)

Is that hypothesis credible? To answer that question, we need to look at the characteristics of current technical change. A complete and rigorous description is well behind the scope of this lecture. However, we can point to two salient features. First, the role of information; and second, the increased automation allowed by the fast increase in computational power.

*inequality and information technology*⁵

Information is both an input and output of most of our economic activities today. We need digital information for every single act in daily life; and it is also an input in many of our production processes.

Information is a very special good. It may be expensive to produce but, in the digital age, it is free to reproduce and disseminate. Copying bits is extremely cheap, fast and easy to do (machine age) Or, in economic parlance, information is a non rival good with a zero marginal production cost. That very special production function has enormous consequences, both on the supply and demand side of the market.

On the supply side, it means that, once the infrastructure exists, capacity constraints become irrelevant. Producers of information goods have the ability to reach millions of customers at no cost. After the telephone was invented, at the end of the 19th century, it took more than 70 years to reach 50 millions customers. Radio took 37 years. The same result was achieved by Facebook in 3.5 years and Angry Birds in35 days. Easy access to such a huge market can yield gigantic profits for the happy producer, provided of course, that it manages to make its content especially attractive to the consumer. Digital technology enables to replicate designs, ideas, processes at absolutely no cost and this gives inventors potential a huge premium.

The counterpart of easy access for the producer is easy choice for the consumers. The same Internet infrastructure that allows information dissemination at not cost, also offers potential consumers immediate and infinite choices. Through instant information and comparison they can ask – and go – for the best. Second-rate producers cannot count on consumer ignorance and distance to protect their situation. Who is going to listen to a bad imitation of a great rock star if they can access the original for the same price? In the information age, success is therefore defined by relative, not absolute, performance. It's not good enough to be good. You have to be the best! An Olympic gold medalist gets instant world fame (and fortune). The silver medal (whose gap with the gold is infinitesimal) gets nothing. It is in the nature of the information economy that the "winner takes all". Relative success and performance gives absolute domination.

Those evolutions have been anticipated three decades ago in a very prescient article in by Serwin Rosen entitled "The Economics of Superstars ". The information age may finally have brought us such an economy. Only superstars can make it and the consequences for the rest of

⁵ most of the ideas and examples in this section, and the following one, are taken from. Brynjolfsson and McAfee

us may be difficult. The superstar paradigm provides an extremely attractive explanation for the increased concentration of income at the very top.

One characteristic of a superstar economy is its indeterminacy. One cannot tell in advance who the "winner" may be. It is certainly a matter of talent and effort. But chance, circumstances and timing will also influence the outcome. Pure luck may play a great role in determining who is successful or not. Depending on time, location, the state of technology and accidental coincidence, some talents and qualifications may be richly rewarded, that, under a different environment would have been ignored. Pelé may have been the greatest football player of all times. Because he lived in an era when television had not yet reached mass audiences, he did not have the opportunity to transform his star power into a huge personal fortune and amassed only a comparative small wealth. JK Rowling made billions because she had millions of readers. Shakespeare was playing for an audience of 300 persons at a time.

What about jobs? Using our previous distinction, it is clear that producing content is a complement to information technology. So, innovators and creators will see their qualification – and remuneration – enhanced. Conversely, technology substitutes to labor for disseminating information and content. Numerous jobs may therefore disappear. Instagramm has helped people share billions of pictures. So did, in its time, the big Kodak Company. For the same contribution to global welfare, however, Instagramm only needs less than 4000 people when, at its peak, Kodak had 140.000 employees.

automation and artificial intelligence

Let me now turn to the second salient characteristic of current technical change: the increase in computing power and automation.

The Economist recently published a statistic that, for someone of my generation, is absolutely astonishing. In October 2014, Apple launched its new iPhone 6, and the usual rush took place over the weekend between fans that could not wait for the new experience and the new sensation. Someone made a simple calculation : the computational power that was added – on that single week end - to the world economy was equivalent to 25 times the total existing capacity worldwide in the year 1995. Make no mistake: the new *flow* added over a week end equaled 25 times the total *stock* available 20 years ago. This was a time when we had no Google, but we already had e-mails, reasonably good laptops, and cellular phones were coming.

That, of course, is just a consequence of the so-called Moore's law, which says that microchips' processing power doubles every two years. The demise of, Moore's law has been widely anticipated but it remains valid, up to now. Now, I am not an expert in artificial intelligence and I am aware of the uncertainties about its current and future development regarding the ability of smart machines to substitute to humans in many activities. However it seems clear that the exponential growth of computing power will lead to increased automation of all those tasks that involve processing a huge amount of data.

Hundreds of thousand of jobs, some of them considered as extremely qualified, depend on making a good diagnosis: not only mechanics, but also doctors, financial analysts, lawyers. A diagnosis, essentially, consists in comparing observable (or measurable) signs and symptoms with a reference framework to identify and characterize situations. Judgment, based on experience, plays an essential role. That's why you want an experienced doctor. However, to the extent that "experience" means accumulated knowledge and the ability to easily process mental correlations, it can be replicated by programs that have access to trillions of data and algorithms. It is very likely that machines will in the future aptly perform those qualified activities that rely on diagnosis. There are already examples of robots that, placed in hospital emergency rooms can detect extreme-suffering symptoms better than experienced and specialized nurses.

Acemoglu and Autor have introduced a classification based on two criteria: whether activities are "cognitive" or not; and whether they are "routine" or not. It turns out that, when projecting the consequences of automation, the second distinction is the most important. Robots will more easily take charge of routine – rather than non-routine – tasks, whether they are cognitive or not. So gardeners, receptionists and cooks may be more secure in their jobs, in the future, than financial analysts or petrochemical engineers.

the nature of work

We are all aware that new technologies - such as 3D printing- will revolutionize production processes. However the transformative power of technology extends well beyond production itself. It has started to change the nature of work. It will continue to overhaul our economic structures and ultimately affect our economic and social institutions.

Uber can be considered as a precursor of the future of work organization: an electronic platform that instantly and directly matches the demand by thousands of customers and the supply by hundreds independent producers. Those producers generally own their capital. The benefits of such an "on demand economy " are huge in terms of flexibility, independence of workers, and efficiency. Overheads are reduced to a minimum; excess capital may be eliminated as the production capacity adjusts more easily to demand fluctuations. There is no need to have personal wealth or social connections to start a business. Each individual has the ability to choose and adjust her work schedule.

That trend may also signal the disappearance of the capitalist firm, as we know it, i.e. an organized and interacting group of workers grouped inside an organizational structure. We are witnessing the rise of the "independent contractor". 53 millions of Americans are estimated to occupy such "independent " jobs either part or full time. The great economist Ronald Coase theorized that firms exist for the purpose of optimizing the interaction between workers - and between workers and customers. Grouping inside a firm could entail some inefficiency but this was more than compensated by the reduction in transaction costs. If technology facilitates transactions between customers and producers, the rationale for structuring production processes around organized firms may be weaker.

In advanced economies however, corporations are more than a production organization. They also provide a framework for defining common objectives, pooling resources, and, yes, to some extent, sharing risk. During the 60s and 70s, extended social benefits – in terms of health and retirement – were attached to quasi-permanent employment in big corporations. That has now been considerably reduced. Nevertheless, economists recognize that it is the common interest of companies and workers to take a long-term perspective and keep and maintain a stable relationship during good and bad times. For workers, in effect, the capital of the firm partially serves as a cushion to absorb ordinary economic shocks (at least those that are not too large). That cushion is not there anymore in the "on demand economy". Workers are freer, more independent but also left alone to face risks, whether economic or personal (health). It is easy to see how this situation can be abused, giving way to what the Economist has called "a sometimes distasteful caricature of technology-driven social disparity".

CONCLUSIONS

Time to come back to inequality, the topic of this lecture.

The overall picture that emerges when looking at current technological trends is one of big changes and significant uncertainty. First, a "winner take all" economy is, by nature, indeterminate, which makes it difficult for people to train, prepare and adjust. Second, the comparative advantage of "superstars" are, by essence, shifting, fragile, and temporary. An information-based economy will, therefore, be "turbulent", with rapidly changing relative situations. Third, we are reasonably sure that huge transformations are coming, that could not have been foreseen only a decade ago. We just don't know which occupations will prove complementary to new technologies - and receive a boost as a consequence – and those that will be substituted by machines and disappear.

Uncertainty, by itself, has important implications for the social dynamics of our societies. In my view, it is the reason for the malaise of the middle class. Qualification, in the traditional sense – i.e. having a college or graduate degree – remains a necessary condition to cope but may not be sufficient, in the future, to protect from the consequences of innovation.

As an aside, uncertainty may have significant macro economic consequences. In a recent column, Rober Shiller mentions the "psychic costs" of income inequality, that are not adequately captured by existing measures of economic uncertainty. He conjectures that there may be a real, if unsubstantiated, link between the anxiety created by technological change and the low level of long term interest rates: anxiety can both stimulate savings and inhibit investment. As you know, low equilibrium interest rates create very difficult policy dilemmas. They may be a cause for "secular stagnation" of our economies. They complicate the conduct of monetary policy in a low inflation environment and make it difficult to simultaneously attain price and financial stability.

Implications for the design of public policies will be significant and, at the moment, are hard to figure out⁶. The conversation on inequalities and growth appears, if not obsolete, at least incomplete. Piketty may be right in a sense. If and when a "superstar" amasses great wealth, it is a legitimate question whether and to which extent it should be transmitted to the next generation. There is a very active debate running in the US on inheritance taxes, where recent billionaires have taken opposite sides. Redistribution, therefore, remains an issue.

However, it may not be the only, or even the main, issue. New technologies are disruptive. They will trigger big organizational changes. They take time to produce benefits. Ultimately, theory and history should make us confident that our economies will get back to a strong and balanced growth path together with a reduction of inequalities. The transition, however, may be bumpy. Should our society be durably divided " between people who have money and no time and people who have time and no money", our whole approach to economic and social policies may need to be fundamentally revisited.

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⁶ for some insights, see in Foreign Affairs July- August 2015