

Adam KORONOWSKI*

Technological Progress and Unemployment: Luddism and Beyond

Abstract: The aim of this paper is to reconsider the role that technological progress plays in bringing about growing economic inequality and “secular stagnation.”

The main part of this paper is a theoretical analysis of the impact that technological innovation has on income distribution. The author argues that standard assumptions related to the production function, though seemingly neutral, have far-reaching consequences for economic reasoning concerning income distribution. Wages and employment are not subject to precise solutions resulting from economic optimization reflecting the technical properties of the production process, but are a result of an interplay of social and political factors at any level of employment. Moreover, technological innovations are labor-economizing in nature and eliminate any grassroots competition due to advantages of scale. As a consequence, the share of labor income declines.

The second step of the analysis concerns the consequences of evolving income patterns for aggregate spending. Along the lines of reasoning typical for Kalecki, the author argues that the declining share of labor income gives rise to stagnation and persistent unemployment. As a whole, the analysis helps explain the “secular stagnation” and persistent unemployment combined with high profits, a process that breeds confusion in contemporary economics. Finally, the author reconsiders possible corrective policy measures. Globalization shows to be a major obstacle to any action that an individual government might decide to undertake with respect to the problem at hand.

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* Uniwersytet Kardynała Stefana Wyszyńskiego w Warszawie, Wydział Nauk Historycznych i Społecznych; e-mail: a.r.koronowski@gmail.com

Introduction

There are a few motifs in the contemporary economic thought that seem to gain importance and to mark out new directions of research. Inevitably, in the present economic situation these must be, firstly, questions concerning economic stability and equilibrium. Although they have always been in the centre of interest in economics, nowadays – when the complacency related to the myth of the great moderation has vaporized – economists must reconsider their attitudes and develop better understanding of both economic downturns and – even more – of prolonged, persistent stagnation and high unemployment.

Secondly, an issue which has been drawing much attention in recent years is income and wealth inequality. This is an important change; income distribution had been long considered as a subject beyond professional economic analysis and burdened with ideological zeal and bias. It turns out, however, that income distribution is important not only socially and politically but it is also crucial for economic processes. In fact, questions concerning economic equilibrium and income distribution used to be closely interrelated in the past. Income distribution and patterns of spending were for quite a long time a leitmotif of economics and it has been fading only with the development of modern trends in economics. Without a doubt, the negligence of income distribution is more ideological than a cool-minded consideration of the issue.

The third motif is a technological change. This is probably least discussed among economists. A technological change – or progress – is usually considered to be positive from an economic point of view. Sometimes it is subject to endogenous growth theories. Technological progress seems, however, principally exogenous to economic processes. Anyway, the questions I am going to ask in this paper do not pertain to the origins but to the consequences of a technological change. These consequences are not just growth of total factor productivity. In these days there are major concerns about the impact of automatization and mechanization on employment, the share of wages in GDP and eventually on a broad outcome of economic processes. The three motifs are thus interlinked. In fact they have been so since the first industrial revolution when the Luddites emerged. And although – or because – their case was dismissed without a truly deep reflection as the Luddite fallacy, it returns again and again.

The anxiety concerning the negative impact of technological progress on employment has continued since the Luddites to the present days. Examples include, just to mention some major positions, Albus's [1976] book 'Peoples' Capitalism: The Economics of the Robot Revolution', Noble's [1993] 'Progress Without People: In Defence of Luddism', Rifkin's [1995] 'The End of Work: The Decline of the Global Labor Force and the Dawn of the Post-Market Era', Ford's [2009] 'The Lights in the Tunnel: Automation, Accelerating Technology and the Economy of the Future', a book by McAfee and Brynjolfsson [2011] 'Race Against The Machine: How the Digital Revolution is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment

and the Economy'. In all these books the authors expressed their concerns not only about obvious direct labor displacement due to technological progress but also about resulting income inequality.

In this paper I intend to reconsider the three motifs and the causality among them. This causality begins with a technological change and through changing income patterns it leads to stagnating economies with high unemployment. From this perspective technological progress is a reason for persistent unemployment which is not merely structural but related to a broader economic evolution. This reasoning is not directly Luddite but it does not share the optimism typical for the Luddite fallacy, either; eventually it confirms that a technological change may bring about tendencies to persistent stagnation and related unemployment. This might seem counter-intuitive as better technologies and rising productivity boost the supply possibilities of an economy; however, if they also undermine the aggregate demand the final effect is negative. I do not argue that there are no forces that might offset these negative tendencies; the problem is that they may be weak in these days.

The broad character of the problem analyzed calls for a descriptive method which presents the logic behind the suggested causality. I develop a new paradigm rather than empirically prove a particular relation and I merely refer to some empirical data and observations which justify the reasoning presented. Of course, further and more detailed analysis along the lines of the reasoning should be welcome. Nevertheless, I am convinced that a quantitative, formalized research with regard to very broad, long-term, macroeconomic mechanisms which are subject to an impact of many dynamic factors external to the problem analyzed can hardly bring clear-cut results. What should be a decisive argument for or against the suggested paradigm is its logical consistency, compatibility with general facts and processes observed and some new utility in explaining them. The compliance with existing elements of the theory and literature is reassuring. I am convinced that the paradigm presented in this paper meets the criteria.

The Essence of a Technological Change and Income Distribution

There are several myths that determine the standard attitude towards a technological change and its impact on wages and employment. They must be called for and reconsidered as a starting point to any further analysis in this paper. Sometimes these myths seem to be just neutral, formal assumptions. This is the case of the assumption of constant returns to scale which is typical for many models. This formal and allegedly neutral assumption has a few important consequences. Firstly, it is strictly related to the assumption of perfect competition. Secondly, it is thus consistent with the condition of normal, zero profits. Thirdly, it means – in accordance with Euler's theorem – that all the proceeds of a firm are divided among factors of production and each factor receives its remuneration equal to its marginal productivity (thus

again no room for profits). The last consequence of the 'neutral' assumption of constant returns to scale eliminates the problem of income distribution; the distribution is determined by technical properties of the process of production and its optimization under the assumption of full employment. The prices of factors of production are at their equilibrium level.

However, if one takes another attitude and assumes positive returns to scale, the picture changes dramatically; factors of production do not get their remuneration equal to their marginal productivity, there is some extra product, in particular there is room for positive profits and thus the problem of income distribution is not technical, but political. Wages are not determined by technology and economic optimization. The distribution of income is not a product of 'objective' factors but it is an effect of social and political processes. As a consequence, the distribution can be modified within some range by economic policy or social play without prejudice against economic rationality.

Another clever view of technology is the idea of factor substitution. It helps to eliminate problems of disequilibria and unemployment where they might emerge in relation to capital accumulation and the capital/labor ratio. The most clear and famous example is Solow growth model. Taking the assumption of the perfect substitution of labor and capital, Solow resolved problems encountered by Harrod and Dogmar. The substitutability permits full employment as long as wages can change in line with marginal productivity of labor influenced by the capital/labor ratio; here we again face the importance of the assumption of constant returns. In fact this paradigm is consistent, simple, precise and elegant. It does not seem, however, to reflect economic reality; it is false.

The assumptions of constant returns to scale and factor substitutability do not say much about the eventual proportions in income distribution. As I mentioned, this problem has been rather purposefully neglected for a long time and all 'neutral', seemingly purely formal assumptions often helped do so. However, even with these assumptions one can ask a question about the ratio between capital incomes and labor incomes, or wages. An example is Piketty [2014] who – being deeply convinced about the importance of the ratio – pays much attention to the elasticity of the substitution between the two factors of production. To justify his claim that the share of wages is permanently diminishing he must argue that the elasticity is less than one. This is dubious [Summers, 2014]. Anyway, the problem of elasticity may be unimportant or even misperceived when one accepts – as I argue below – that the substitution is very limited and, when it happens, it is not strictly related to changes in remuneration.

It seems fairly realistic to claim that there is little room for the substitution given a particular, currently effective technology; that is the reason not to pay much attention to the alleged elasticity of the substitution so important for Piketty. Moreover, we may realistically claim that technological progress is capital intensive so that historically there is one-way substitution between factors of production related to changing technologies – the ratio of capital

to labor is rising. It must be stressed that the permanent substitution of labor by capital ('machine-replacing-labour technical change' in [Acemoglu, 2011]) must not be mistakenly identified with substitution along the effective production curve which – as my argument goes – is very limited.

If capital intensity rises fast enough (faster than capital accumulation) employment in the sector(s) under consideration falls. This should be considered as merely structural (Luddite) unemployment and it should not be mistakenly identified with unemployment caused by depressed demand as discussed in this paper. However, higher capital intensity seems correlated with the rising scale of production and advantages of scale and their consequences for income distribution.

Even when unemployment is rising there may be good reasons for wage increase such as higher qualifications needed or better motivation of workers who share more responsibility for the process of production. The ratio of capital and labor incomes is not strictly determined, as I argued. There is no reason, respectively, why wages of workers still employed should rise proportionately to the product per worker. Wages may rise or fall but the share of wages in the rising product would decline; after all this is one of driving forces behind technological progress.¹ In particular, the aggregate labor income could even fall in absolute terms as in the example by Hulka-Laskowski provided in the next part of the paper.

Summing up, it is impossible to unequivocally prove theoretically that technological progress must lead to a declining labor share in incomes. However, standard assumptions of formalized presentation of production do not leave much room for the analysis of income distribution. It is only less formalized but more realistic an attitude towards the character of technological progress that constitutes a good basis for the analysis of a changing income structure.

A declining share of labor incomes in GDP is actually a well-documented – if not clearly explained – fact. With respect to a time span of thirty years and across OECD countries the process is described and analyzed in [OECD, 2012]. The OECD paper links the phenomenon to a technological change, too. It refers to the literature and sums it up: 'Recent academic work on the decline of the labour share has pointed to the role of capital accumulation and capital-augmenting technical change'. However, theoretical justifications of the empirical observations are made 'under standard assumptions'. The same pertains to a paper by Karabarounis and Neiman [2013]. As I argued above these assumptions are arbitrary, unjustified and although within their structure – as in the case of Piketty – it is possible to explain the declining share of labor incomes, the assumptions are not neutral. They are not realistic, either. What really matters in these papers is not sophisticated but kinked theory:

¹ In this paper I neglect any stratification of labor incomes and I pay attention to labor to capital income ratio.

it is good documentation of the empirical fact of the declining labor share and the idea that relates the decline to technological innovation.

The conviction that a technological change matters for evolving patterns of income distribution is avowed in numerous works, some already referred to, and it is shared in this paper. However, as I have mentioned, if we reject strong and unrealistic assumptions, income distribution is not strictly determined by the process of production and technology. It is also an effect of political and social forces. Market structures and macroeconomic policy determine price setting which have an effect for profit margins and income structure. I am convinced that technology matters in the sense that it makes room for profits gaining a bigger share in incomes. This tendency – when excessive – can be corrected given proper social, political and economic mechanisms are in place. Of course, it would not make sense to blame and hinder technological progress but it is necessary to recognize the challenges that it poses.

Increase in economic inequality, which has a clear bearing on the labor share in incomes, has also become a subject of studies which pay attention more to its' social and political consequences rather than its origins. These include in particular [Stiglitz, 2012], [Zingales, 2012] or [Rajan, 2010].

Income Distribution, the Demand Constraint and Unemployment

Must the declining share of labor incomes be accompanied by rising unemployment? Even an answer to a similar question formulated in absolute terms is not obvious. Do lower wages (and in effect their lower share) promote employment or do they rather bring about higher unemployment? Both contradictory answers can sometimes be given in one short passage as in OECD Employment Outlook 2014 [OECD, 2014]: 'Wage adjustments have a key role to play in helping the labour market weather cyclical downturns and in promoting stronger employment growth during the recovery. (...) Reductions in earnings also reduce consumer spending and dampen aggregate demand.'

In this part of the paper I argue that technological innovation is not only a reason for temporary, structural unemployment but – more importantly – technologically induced decline in the share of wages may be a source of persistent, Keynesian unemployment.

I would like to begin with a historical relation of the development and decline of the town Żyrardów near Warsaw, a book by Hulka-Laskowski [1934]. The town emerged in the early nineteenth century as a functional part of a modern weaving factory established by a Polish noble family with an aim to industrialize their land property. Having changed the owners the factory and the town developed quickly. It was a nice example of patriarchal capitalism with living blocs, kindergarten, schools, a medical center and social care all supported by the factory. What is important for the subject of this paper is the evolution which came with further technical innovation. In the beginning the new, modern factory sucked villagers turning them into more and more

numerous workers. At a moment, however, new inventions made many of these employees redundant. Hulka-Laskowski wrote: 'A book about industrial reorganization and rationalization may be very interesting but it can never substitute direct observations. It is easy to understand rationalization when one is informed in a factory workshop that 5–6 workers are employed where earlier in the same place 40 workers did the same job. Do these 5 men earn 8 times more? No! Their wages are 20–40% higher at most (...). (...) Rationalization fires millions of workers and creates an army of the unemployed. Those who still have a job produce much more than before rationalization, where everybody was employed. When we move to a storehouse we see that it is overfilled with ready products. What is the reason for such stocks? Huge production, little demand. The unemployed have lost their jobs and their ability to buy goods (...).'

This quotation points at technological progress and a more general 'rationalization of production' as a source of unemployment. This is not only a structural unemployment in one sector or one huge factory such as Żyrardów. The above quotation presents the problem as one of a much bigger scale and macroeconomic character; lower labor incomes dampen aggregate demand.

In the case of Hulka-Laskowski's observations the relation between the technological change and 'Keynesian' unemployment is clear and pivotal. Keynes paid less attention to technology as a driving force for macroeconomic disequilibrium and – when he did – his opinions were far from being consistent. Keynes [1963] used the term 'technological unemployment' in 1930: 'We are being afflicted with a new disease of which some readers may not yet have heard the name, but of which they will hear a great deal in the years to come – namely, technological unemployment. This means unemployment due to our discovery of means of economizing the use of labor outrunning the pace at which we can find new uses for labor. But this is only a temporary phase of maladjustment.' The last sentence suggests that Keynes perceived technological unemployment as merely structural. At the same time Keynes predicted that a century later there would be a 15-hour work week. It means Keynes saw also the long-lasting, permanent problem of labor becoming redundant due to technological progress; 'full employment' would not be possible unless fewer necessary working hours were dispersed among all members of the labor force. Of course fewer working hours could not mean less pay if it were to be a solution. Turning back to the example by Hulka-Laskowski 40 workers should work for (at least) the same pay but each only 1/8 of the previous working time.

The relation between income distribution and aggregate demand which could support full employment or high economic activity has long been an important issue in economics. In the beginning income distribution and circulation was accentuated by Physiocrats and Quesnay in particular. One aspect of his point of view was the role given to landlords as a group of high incomes and also high spending for services and goods, which allowed constant

income circulation. The most spectacular failure to understand the meaning of spending for a sustained flow of income was Say's law. The most acute presentation of the role of income distribution and a demand constraint was developed by Marx and his followers. High incomes of capitalists are in the Marxist theory mostly saved for investment. Profitable opportunities to invest are however limited due to low incomes of workers and thus low consumption demand. Inevitably the flow of spending does not suffice to support the level of production and the level of employment already attained. Keynesian demand constraint is not in fact very far from this concept, except that it eludes any socially and politically thorny idea of a systematic impact of income distribution on aggregate spending; in exchange Keynes offered rather elusive ideas of animal spirits and investors' sentiments. The observations on the same problem developed by Kalecki are more profound and relate a demand constraint to income distribution. The line of reasoning in this paper follows in his steps with emphasis put on a technological change as a trigger.

Kalecki [1933] wrote that 'capitalists spend money and it does not matter if these are purchases of investment equipment or consumption goods; anyway, money spent creates incomes of other capitalists. (...) Capitalists, as a whole, determine their own profits by the extent of their investment and personal consumption'. 'In a way, they are masters of their own fate.'

The pivotal problem is whether capitalists are ready to spend much enough from their high incomes and make money flow through the economy without a major diminution in any period. To sustain the flow of income capitalists – or companies and their owners – must spend the whole of their incomes. Of course, it would be in part investment. Investment, however, is determined by the needs to preserve and develop productive capital (not necessarily physical) and it must be justified by the prospects for sufficiently high demand for consumer goods. If investment were lower than capital incomes not spent on consumption, disequilibrium would appear. That is why consumption spending of capitalists is so important; it guaranties that all incomes return to the flow and sustain production and investment. If, as Marx, we assume high incomes of capitalists and we neglect their supposedly meaningless consumption, disequilibrium is inevitable. Kalecki, in a way similar to the attitude taken by Physiocrats, includes and emphasizes the possibility of sufficiently high consumption of the rich. According to a famous Kaleckian aphorism: 'Workers spend what they get; capitalists get what they spend'. If they don't spend their incomes on investment and consumption, they subsequently get less and the economy shrinks.

Of course there is no social justification for exorbitant consumption of capitalists which should counterbalance low consumption spending by employees. There is no justification for a claim that the higher profits, the better for the economy, either. High profits may be too big for reasonable, productive investment, so they do not boost economic development. If they are spent on excessive capitalists' consumption, a question of a fair income distribution arises. If they are not spent, a recession follows.

It is much premature to say that the Luddite premise is dead and to proclaim the Luddite fallacy. On the contrary, the original Luddite connection between a technological change and structural unemployment is rather only an interlude to a much more severe relationship between technological progress and persistent, 'Keynesian' unemployment.

In order to avoid any misunderstanding I would like to openly recognize the positive effects of technological progress. An innovation makes production possibilities rise. Due to more productive use of resources, i.e. lower costs, a unit of production is cheaper in real terms. However, it is naïve to contend that this is enough to boost the real demand so that it should be sufficient to absorb the bigger product.

An example of such naïve reasoning can be found in a popular Wikipedia [2015] presentation: 'If a firm's technological innovation results in a reduction of labor inputs, then the firm's cost of production falls, which shifts the firm's supply curve outward and reduces the price of the good (...). The widespread adoption of the innovator's technology could lead to market entry by new firms, partially offsetting the displaced labor, but the main benefit to the innovation is the increase in aggregate demand that results from the price decrease. As long as real prices fall (or real incomes rise), the additional purchasing power gives consumers the ability to purchase more products and services.'

A pivotal problem neglected in this passage is who gains in effect of rising real incomes – employees or owners of capital. Technological progress improves efficiency and it entails lower cost of a unit of production. Higher efficiency gives room for higher profits and/or higher real and nominal wages. It is impossible to generally determine the distribution of the extra real income. However earlier remarks strongly suggest that it would be capitalists (entrepreneurs) who gain most.

The above quotation from Wikipedia is nothing but an expression of Say's law. Of course, money incomes are equal to the value of production sold but the problem is that not all product is necessarily sold. When real product rises, money incomes from this product may – or may not – still be equal to the value of the product at current prices; a part of the product may remain unsold. If all production is sold, real money incomes actually rise as in the quotation; the expansion of production possibilities is maintained. We know, however, that it is not guaranteed. Value added, or the product, may not meet sufficient demand and thus it would not be transformed into money incomes, which would further dent demand. This may happen, as I argue, due to a changing social composition of incomes that accompany a technological change and, in particular, due to falling labor incomes and consumer spending. Cost effective innovation would be beneficial for an individual firm (or a sector, including new firms) when it does not affect the demand for its product. This microeconomic thinking does not apply to the whole economy where technical innovations may change the social distribution of incomes and – given some patterns of spending – eventually have a negative impact on the demand for the product of every firm.

The effects of the evolution of income structure for the aggregate demand may wane due to simultaneous changes in spending patterns. Companies may, for example, spend more eagerly in a milieu of low interest rates typical for the recent decades. Saving money, hoarding incomes, makes little sense. If there are any financial surpluses they must be invested and there is temptation to leverage. Banking assets are expanding. It is clear – and has been already mentioned – that possibilities for reasonable, productive (even not necessarily physical) investment are limited. This gives rise to financial investment frenzy which inevitably gives rise to recurrent speculative bubbles and crises. Eventually, as a by-product, when a crisis comes a redistribution of wealth follows. A financial crisis has also negative effects for the flow of value in the economy; during a boom the flow is distorted and propelled excessively, after a bust it is halted. In this sense any monetary efforts to boost demand prove to be eventually damaging.

Monetary easing, mostly in the periods of conventional monetary policy, has also an effect of inflating credit to households that try to keep the path of consumption growth in spite of stagnating or even falling incomes. This should boost demand ('privatized Keynesianism' [Crouch, 2009]) but it also must eventually lead to excessive debt levels and inevitable cuts in spending. This tendency may be strengthened by financial deregulation resulting in the proliferation of 'ninja' borrowers. These phenomena and their recessionary effects are well recognized in the case of the financial crisis of 2008. Examples of its analysis, backed by theoretic models, include [Kumhof, Ranciere, 2010] and [Bertrand, More, 2013].

Furthermore, the aggregate demand and the flow of value in the economy is often boosted by public spending. It is not necessarily a kind of a fully deliberate Keynesian intervention but – similarly to growing private debt – it may be helpful in a short-medium term. However, in a long term, when the debt becomes excessive, this strategy brings about a contraction. A recent attempt at establishing theoretically and proving empirically a link between an increase in inequality and raising public debt in a milieu of liberalized financial markets is [Azzimonti et al., 2012].

The above remarks concerning spending patterns suggest that although there may be some mechanisms that promote spending of increasingly stratified incomes, they may be eventually only temporary, insufficient and in longer terms even counterproductive. Of course, there may be other factors and mechanisms, less general and more subtle; the question of spending patterns is broad and it would demand an equally broad economic and sociological research in the spirit of Thorstein Veblen. It is impossible to present a hard, theoretical proof that growing income inequality must necessarily entail that the aggregate demand eventually falls below the aggregate product. However, this old concept of economics could not be easily dismissed, either. There is new evidence that suggests and research that claims inequality may cause disequilibria, tensions and slumps. Growing inequality should thus be subject

to some corrective measures; not only for its own sake but also for the sake of economic equilibrium and prosperity.

How to Curb Excessive Inequality

Since many of the ideas in this paper are not entirely new – and some have a very long tradition – it naturally follows that there have been also proposals to solve the problem discussed. At first, with a clear relation to a technological change, it was Luddite rage against the machine. Then, with class inequality in the foreground, it was Marxist rage against the capital. Eventually, more moderate ideas emerged.

Since it is capital incomes that rise relatively to labor incomes it seems natural to spread capital ownership and as an effect inequality and resulting problems would disappear. Albus [1976] laid out a plan to broaden capital ownership to the point where every citizen becomes a capitalist with a substantial income from personal ownership of capital assets or – to express it in the words of the title of his book – to build a peoples' capitalism. However, this simple proposal had one crucial deficiency; it was based on a naïve assertion that wealth can be spread more equally and thus flatten income differences. It is just the opposite; high income inequalities increase wealth stratification. The aim to spread wealth needs income redistribution (unless more revolutionary measures are taken). In Albus's proposal the target becomes a necessary mean. It is inconsistent.

Rifkin [1995] presented some 'post-market' ideas that came down to creation with a government support an extra sector of social services and to provision of social wages to its workers. To finance this enterprise, Rifkin advocated raising taxes and scaling down the military budget. This would be a mixture of Keynesian intervention and a 'welfare state' at its extremes.

In the recent decades services have constituted a 'tertiary sector' which provided a relatively high share of labor incomes and attracted much spending and in this way the sector helped sustain the flow of value in the economy. In these days, the services sector does not seem to play this role anymore and it rather undergoes labor economizing technological and organizational changes. There is no candidate for a 'quaternary sector' in sight. What Rifkin argued for was creating administratively such a sector beyond the market economy.

In the developed world we are not very far from Rifkin's recommendations; a big public sector renders social services such as education or public health or administration and it provides remuneration to its employees financed from taxes. However, it is neither aimed at nor does it meet the targets demanded by Rifkin; it is not a major mechanism of income redistribution from capital to labor or from the rich to the poorer. Firstly, due to the character of present tax systems, government revenues come from low or medium income taxpayers rather than from big companies and rich individuals. Secondly, salaries in the public sector often remain low and in this way the functioning of the

sector exerts a wider negative pressure on labor remuneration. For example, low teachers' salaries in dominant public education, possibly combined with poor quality of the services, would keep remuneration low in private schools and for similar occupations. Other possible features of the public sector such as its excessive size and employment or big deficits have a further negative impact on the economy and do not change the fact that the sector rather does not play the role of rebalancing the economy through income redistribution. It can, however, temporarily boost the demand at the cost of growing public debt.

McAfee and Brynjolfsson [2011] call for different measures; they recommend governments consider modifying public education systems to place greater emphasis on teaching creativity and entrepreneurship, increasing investments in infrastructure and basic research, and revising tax policies to reward employers for hiring people and to increase the tax rates on wealthy individuals. Some of the proposals seem to be misdirected. Creativity and basic research are a good thing, as technological progress is, but it does not solve the problem. Public investment in infrastructure is an old Keynesian method to boost the aggregate demand but it cannot be a macroeconomic instrument, not in these days. Teaching entrepreneurship can make people fighting even more eagerly for their piece of the cake as entrepreneurs rather than employees. However, it would not help much with little room for new, small-scale businesses due to low consumption spending and strong competition from cost-effective, big corporations. Enhanced entrepreneurship can't boost deficient demand. From the measures recommended by McAfee and Brynjolfsson only revising tax policy hits the point.

Wealth and income taxes are the most direct – and thus supposedly the most effective – way to address the problem of excessive inequality. It is not thus astonishing that modifying tax systems is a recurrent recommendation. Some ideas are specifically aimed at correcting income effects of a technological change, for example by an extra tax on highly automated companies [Ford, 2009]. However, changing tax systems may not be as simple as the idea behind it. Summers [2014], commenting on Piketty, wrote: 'Perhaps the best way of thinking about Piketty's wealth tax is less as a serious proposal than as a device for pointing up two truths. First, success in combating inequality will require addressing the myriad devices that enable those with great wealth to avoid paying income and estate taxes. It is sobering to contemplate that in the United States, annual estate and gift tax revenues come to less than 1 percent of the wealth of just the 400 wealthiest Americans. With respect to taxation, as so much else in life, the real scandal is not the illegal things people do – it is the things that are legal. And second, such efforts are likely to require international cooperation if they are to be effective in a world where capital is ever more mobile.' In the first place, however, any tax reform needs political support based on clear arguments and it may be difficult to win with the public discourse restricted, manipulated and biased [Stiglitz, 2012].

There are also other measures which directly and administratively influence incomes; these would be all forms of minimum or guaranteed wage. Although

this kind of regulation might be socially justified, it may not change much the problem discussed in this paper; I have contended before that wages may rise with a technological change. The problem is not that individual wages are low but that the share of aggregate labor income declines and eventually it is insufficient to keep the flow of income in the economy and to support high employment.

Instead of imposing administrative regulations it would be in principle possible – and better – to let market forces play its' role. However, with high and rising unemployment it would be rather unrealistic to claim that unimpeded market forces could bring about wage increase, rise in labor incomes share and eventually economic recovery. As I have argued before, intuition and rationality at the micro level would demand wage cuts; wage decrease is also a naïve recommendation in the face of recession. The reasoning behind the recommendation often serves questioning and undermining the role of trade unions. In fact, any labor representation which can offset the power of employers may be beneficial not only to these currently employed but also to those unemployed due to a low share of labor incomes and low spending in the economy. A part of the solution to the problem analyzed in this paper would be more power in wage negotiations given to labor, a political and legal evolution changing the present predicament developed under a 'liberal' doctrine when atomized employees face the labor market dominated by huge employers.

Finally, there is some role that price mechanism can play in the redistribution of real incomes in favor of employees; this could happen via deflation. To be precise – I mean both 'good' deflation which is a manifestation of falling costs (technological progress) and 'bad' deflation resulting from deficient aggregate demand [White, 2006, 2006a]. In the first case, prices falling in the wake of lower costs mean that profits do not rise freely, do not absorb all advantages of enhanced efficiency and do not gain ever bigger share in GDP. In the second case, bad deflation has a corrective power when profits have risen high, the share of labor incomes is low and as a consequence companies face problems to sell their product. Reduced prices mean entrepreneurs giving up an excessively high level of demanded profits which cannot be realized at deficient demand. Price competition may induce entrepreneurs to cut prices in expectation to sell more. Given existence of proper market incentives this is reasonable at micro level. From a macro perspective it leads to a redistribution of real incomes in favor of labor and lifting the barrier of deficient aggregate demand. Of course, the above mentioned naïve recommendation to cut wages would have the opposite effect.

With no doubt there are limits of the beneficial role of 'bad' deflation. If recession is really very deep and many companies can't sell for the price which would cover costs we are beyond the realm of merely income redistribution. Some measures to boost demand would be thus advisable. This is, however, a special case which is not important in these days of stagnation and high

profits. I do not recommend, either, that highly leveraged, speculative zombie businesses, for example in real estate sector or finance, should be rescued by expansive public policy.

For deflation to play its role, some conditions must be met. Firstly, prices must be at least to a degree flexible downward. This in turn depends on the market structure and the existence of proper market incentives. Too little competition, too big companies with monopolistic position reduce incentives to influence sales by a single company through price adjustments. However, even in the present decade in the developed world there are periods of deflation in spite of monetary policy hysterically opposed to any fall in the price level. Thus we come to the second condition; monetary policy should not oppose deflation. We need a major change of the contemporary paradigm of monetary policy dominated by the target of 'price stability' identified with low inflation.

Of course, any gain of labor at the expense of capital would result in a counteraction; in particular, in efforts to economize on labor through further technological innovation. I argued that the substitution of the factors of production is very limited given any current technology but there is a secular tendency to more capital intensive methods of production. There is nothing wrong in these countering forces as long as they are properly balanced. The pivotal problem considered in this part of the paper is how to promote the lasting achievement of such a balance. For that purpose we need permanent mechanisms. In my opinion the best way to meet the target is to create conditions, firstly, for better labor position in wage negotiations, secondly, for downward price flexibility through improved market structures and modified paradigms of monetary policy and, thirdly, to apply corrective tax measures. Without a doubt, it is easier said than done.

There is one particular difficulty; globalization. In an open economy employees compete with foreign labor force. Higher domestic wages may either shift production abroad (through capital flows) or substitute imports for home products which eventually comes up to the same thing. As a result traditional industrialized economies have faced a tendency to become postindustrial wastelands. Only countries with innovative or prestigious products which escape price competition may hope for redemption.

This possibility is not given to middle income imitators and it gives rise to the phenomenon of the middle income trap. Countries can't for long fuel domestic demand and growth by foreign financing, no matter whether to cover investment spending by domestic or foreign companies or private consumption. They cannot condition their economic growth on net exports endlessly, either. Given the condition of a sustainable, long-term balance of payments equilibrium, increase in domestic demand is the precondition of sustainable growth. By keeping wages low middle income imitators lack a permanent, internal engine which should make the economy move. However, if wages were to grow there, the economies would lose their competitiveness and incomes. This is a vicious circle. Less developed, open economies can grow as

long as they suck foreign investment (which usually also needs imports of capital goods) and they can pay for it with exports. It may be supplemented with foreign financing of some extra domestic consumption and respective imports. When middle income countries have exhausted these possibilities of growth at low wages, they are stuck. This situation is a particular realization of the global problem of insufficient demand due to low wages and high labor productivity.

The problem is that cheap labor became globally abundant, as global is labor-economizing, big scale production which can be easily relocated. There is no country in the global economy which could individually oppose the tendency of the declining/low share of labor incomes. By trying to do so governments risk losing the productive base of their economies. The effects for individual countries may differ due to the levels of income and wealth attained, specific structural features or just temporary phases linked to the dynamics of foreign financing and debt.

Globalization has evoked a lot of criticism and even popular anger. However, in mainstream economics it is still perceived in a simplified way as a beneficial international division of labor. Without questioning its advantages, globalization evidently needs a broader and deeper analysis, also along the lines sketched in this paper.

Each of the ideas to solve the problem discussed would be doomed to failure when introduced by an individual government of an open economy. Either higher taxation of profits or any tools to increase wages would lead to the same effect: loss of international competitiveness and resulting capital outflows and trade deficits. The government would be 'punished' by financial markets and eventually by its own voters.

Conclusions

'Secular stagnation' so much heralded in these days and a poor condition of the world economy, particularly due to and after the financial crisis of 2008, lack good diagnosis and recommendations for economic policy. New perspectives and paradigms are necessary to explain the phenomena of persistent stagnation and unemployment. This paper offers a building block of such a new paradigm.

I argue that seemingly neutral but far reaching assumptions in the formal analysis, the negligence in recent decades of the pivotal problem of income distribution and circulating, a narrow and separated perception of globalization are these features of contemporary economics which make it impossible to explain and solve the problem discussed.

I contend that technical innovations, so much needed and welcome, have an impact on the social structure of incomes and – consequently – of spending. Declining share of labor incomes may undermine consumption spending and give rise to a persistent tendency to stagnation and 'Keynesian' unemployment.

While the Luddite attitude points at temporary, structural effects for (un) employment, the link between a technological change and unemployment through changing income structures is much more profound and long-lasting. There are no automatic mechanisms which should always revert the negative impact of technical innovation on employment. Some conscious actions are needed to solve the problem. In particular, they may include policies to strengthen labor position in wage negotiations, to improve market structures and promote competition and downward price flexibility and, last but not least, to apply corrective tax measures. However, all these policies are bound to fail in the globalized economy. Individual governments that would try to change the distribution of incomes to labor's advantage and in expense of profits would soon be punished by financial markets and eventually by their voters.

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POSTĘP TECHNOLOGICZNY A BEZROBOCIE: OD LUDDYZMU PO WSPÓŁCZESNOŚĆ

Streszczenie

Celem artykułu jest rozpatrzenie wpływu postępu technologicznego na strukturę dochodów oraz – poprzez skutki dla popytu zagregowanego – na tendencję do uporczywych stagnacji i bezrobocia nękających współczesną gospodarkę.

Osią tego opracowania jest teoretyczna analiza wpływu postępu technologicznego na podział dochodu. Przedstawiona analiza wskazuje, że standardowe założenia odnoszące się do funkcji produkcji, chociaż pozornie jedynie techniczne i neutralne ze względu na wnioski, mają zasadnicze znaczenie dla ujęcia kwestii podziału dochodu, w praktyce wyłączając tę kwestię z analizy ekonomicznej. W rzeczywistości płace nie są wynikiem precyzyjnych rozwiązań odzwierciedlających ekonomiczną optymalizację zdeterminowaną technologią i równowagą rynku pracy, lecz są wynikiem gry społecznej i politycznej dla danego poziomu zatrudnienia. Ponadto innowacje technologiczne mają pracooszczędny charakter, a dodatnie korzyści skali typowe dla postępu technicznego eliminują wszelką oddolną konkurencję. Właściwości postępu technologicznego sprawiają, że udział płac w dochodach wykazuje tendencję spadkową.

Przedmiotem drugiej części analizy jest wpływ rosnących nierówności dochodowych na popyt zagregowany. W duchu właściwym pracom Kaleckiego autor wskazuje, że spadający udział dochodów płacowych stwarza tendencję do stagnacji i uporczywego bezrobocia. Całość analizy pozwala więc wyjaśnić stagnację i uporczywe bezrobocie współistniejące z wysokimi zyskami, stan prowadzący we współczesnej ekonomii do konfuzji.

Na zakończenie rozpatrzone zostają możliwe środki zaradcze. Zgodnie z podstawowym wnioskiem z tej części analizy globalizacja stanowi zasadniczą przeszkodę w skutecznym podjęciu prób złagodzenia omawianego problemu przez pojedynczy rząd.

Słowa kluczowe: technologia, bezrobocie, podział dochodu, polityka gospodarcza, globalizacja

Kody klasyfikacji JEL: E24, E25, E32
