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Book review

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The Power of Creative Destruction: Economic Upheaval and the Wealth of Nations

by **Philippe Aghion, Céline Antonin, and Simon Bunel**

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Some 30 years ago the world looked much better. Capitalism won the Cold War, and the future was bright. It was Francis Fukuyama's "the end of history". Now, the future has arrived, with the rising of everything: inequality, job insecurity, populist movements, carbon dioxide levels in the atmosphere, and there are other environmental concerns, such as the decrease in biodiversity. There is possibly only decline in competition in the product markets, which has produced substantial rents due to the increase of barriers to entry. Does this mean the end of capitalism instead of history? It was Joseph Schumpeter who thought that capitalism was doomed. For a simple reason: the lack of competition, as powerful incumbent firms, however they became powerful, create barriers to entry for creative innovators, since the innovations would destroy their rents. In short, the creator of the concept of creative destruction believed that the incumbents' fear of destruction (of rents) would prevent creation and that would be the end of capitalism.

Philippe Aghion, Céline Antonin, and Simon Bunel, the authors of the book, subscribe to the conceptual framework of creative destruction[1], but do not endorse the conclusion about the capitalism's doom. On the contrary, they believe that harnessing the power of creative destruction is the way to invent a better capitalism. Apparently, the authors consider, and that was vividly demonstrated throughout the book, that there is substantial room for improvement of capitalism, as it does not perform efficiently in many areas. From the very beginning of the book, the authors point out that the price of innovation is destruction and that the way to handle that destruction is something that enables innovation to bring about the growth of prosperity, as it did in the past two

[1] Philipe Aghion has used the conceptual framework of creative destruction to formulate a seminal model of endogenous economic growth (Philippe Aghion and Peter Howitt 1992) based on vertical innovations, in which an introduction of a new product (creation) replaces the incumbent one (destruction). The other seminal model of endogenous economic growth (Paul M. Romer 1990) is based on horizontal innovations, i.e. diversification of production.

hundred years – it was creative destruction that provided previously unimaged prosperity for human beings.

At the very beginning of the book, like in every *lege artis* written book on economics, in Chapter 1, the authors provide the definition of the key concept and spell out the purpose of the book. "Creative destruction is the process by which new innovations continually emerge and render existing technologies obsolete, new firms continually arrive to compete with existing firms, and new jobs and activities arise and replace existing jobs and activities. Creative destruction is the driving force of capitalism, ensuring its perpetual renewal and reproduction, but at the same time generating risks and upheaval that must be managed and regulated" (p. 1). As to the purpose of the book, the authors are very specific with three of them: "(1) penetrate some of the greatest historical enigmas associated with the process of world growth; (2) revisit the great debates over innovation and growth in developed nations; and (3) rethink the role of the state and civil society" (p. 1).

According to the authors, there are several ideas that constitute the paradigm of creative destruction. The first one is that innovation and diffusion od knowledge are at the heart of the growth process, as the long-term results from cumulative innovation, where each new innovator "stands on the shoulders of giants". The key word is *cumulative* – reinventing the wheel is nothing but wasting resources. The second idea that innovation relies on incentives and protection of property rights, as it comes from investments in research and development (R&D). The incentive for those investments is innovation rent, hence protection of property rights of innovators is essential to innovation. Something that should be taken into account in debates on supressing patents protection granted to the innovators in COVID-19 vaccines. The third idea is creative destruction itself: new innovations render former innovations obsolete and there is a permanent conflict between old and new. "Creative destruction thus creates a dilemma or a contradiction at the very heart of the growth process. On the one hand, rents are necessary to reward innovation and thereby motivate innovators; on the other hand, yesterday's innovators must not use their rents to impede new innovations" (p. 4). The authors believe that it is possible to overcome the dilemma by regulating capitalism, in the words of Raghuram Rajan and Luigi Zingales (2004) they refer to "saving capitalism from the capitalists".

As to the empirical evidence regrading to relations between creative destruction and growth rates, the authors provide data for the US. There is a substantial correlation between the US growth rates and the number of patents. Another piece of evidence is the finding that most of the net job creating in the US has been done by the firms whose age is less than one year: job creation has been done mostly by the new entries (John Haltiwagner, Ron Jarmin, and Javier Miranda 2013). The main finding is that throughout the developed countries there is significant correlation between GDP *per capita* growth rates and creative destruction (average between rate of firm creation and rate of firm destruction). Finally, the authors empirically demonstrate that: "The larger the firm grows, the less likely it is to innovate. In addition, innovations generated by smaller firms are more radical and more significant than those generated by larger firms" (p. 8).

Chapter 2 explains the enigma of economic growth take-offs. The authors confirm that, although there were several growth episodes in Europe, the sustainable growth providing a lift for the take-off came with the Industrial Revolution. What is the explanation for the sustainability of economic growth after it was triggered by the Industrial Revolution? In essence, the explanation is demographic (Oded Galor and David Weil 2000). With the initial rise in population, the scale effect of population on innovation became significant (the bigger the population, the more customers there are, so more incentive to innovate) and a demographic transition occurred, as with technological progress parents desire to provide more human capital for their children, making them competitive on the labour market, inevitably decreasing the number of them. The synergy between the two enabled the escape from the Malthusian trap and GDP *per capita* increased substantially. High impact innovations have been made possible by the joint evolution of science and technology (Joel Mokyr 2017), due to the diffusion of knowledge and information. Obstacles to creative destruction were removed by the competition among nations in Europe and were facilitated by the emergence of "institutions that protected innovators' property rights" (p. 33). Financial intermediation supported industrial take-off. Accordingly, the technological progress that made possible the Industrial Revolution and the creative destruction that actually produced it did not fall from the sky.

The crucial question in Chapter 3 of the book is should we fear technological revolution, like people feared the industrial one. The authors explain that what matters for economic growth is the progress of general-purpose technology: the technologies that spread to all sectors of economy, spawn secondary innovations, and enables costs to the users to decrease over time. All that takes time; hence the advent of new general-purpose technology does not produce immediate results[2]. One of the results of every new technology is that it destroys jobs, but the authors provide evidence that contemporary bout of automatization, based on robotization, even creates more jobs at the same plant than it destroys. There are two main effects of automatization that produce that result: productivity effects, as the firm becomes more competitive and wins new markets and more customers, and eviction effect as the firms who automatise do not go out of the business, taking over the markets of those who do. The authors provide ample evidence to support their finding that taxing robots, a policy proposal that has been making headline these days, is counterproductive.

Chapter 4 deals with competition and its relation to economic growth: is competition a good thing? The answer depends on whether the firm is close to the technological frontier (state-of-art technology) or not. The reaction of the firms close to the frontier to competition is positive: they invest more in R&D and innovate more. Firms far from it are discouraged by the competition to innovate. This is an empirical regularity recorded in a single case (the UK economy) in only one paper (Aghion et al. 2009). The authors did not provide a theoretical explanation of this regularity, instead they just provided the example of the assumed reaction of the students when a new brilliant schoolmate joins the class. Based on the conclusion that the more competition

[2] It was Robert Solow who famously remarked in 1987 that: "You can see the computer age everywhere except in the productivity statistics".

there is, the more innovation there will be by the frontier firms and less innovation by non-frontier firm, the authors made three predictions.

The first is that competition is great for the growth of developed countries, where a majority of the firms are close to the technological frontier. The reader is a bit puzzled: does it mean that competition is not good for the growth of developing countries? The second is that there is an inverted-U relationship between competition and growth, due to the composition effect that encompass both positive effects on the innovation, in the case of frontier firms, and negative effects on the innovation by the firms lagging behind the technological frontier (Aghion et al. 2005). The third prediction is intuitive: there is a complementarity between competition and protection of intellectual property rights. Furthermore, the authors, acknowledging that the "vertical" industrial policy – the one that picks winners – is counterproductive, supporting the blend of next generation industrial policies: "(1) investing in the knowledge economy (especially higher education and research); (2) reforming labor and product markets to make them more dynamic, through appropriate policies for competition, unemployment insurance, and professional training; and (3) developing venture capital and private equity to provide funding for innovation" (p. 68). The authors find that the main arguments for such government intervention is the path dependency of innovations and the coordination problem, aggravated by the high fixed costs of entry.

With inequality recently being a ubiquitous academic topic, the authors dedicated Chapter 5 of the book to the relations between innovation and inequality. The first insight within the paradigm of creative destruction is that innovator appropriates the rent and reduces the costs (among them unit labour costs), with both developments increasing inequality, measured as the share of the income of the top 1%. The innovation-based destruction of incumbent businesses also increases inequality measured in the same way. Nonetheless, more creative destruction means more social mobility. Finally, the authors claim that the relationship between innovation and broad measures of inequality (like the Gini coefficient) is ambiguous. Furthermore, according to the authors, it is legal barriers to entry that are the significant source of inequality, and those barriers (the result of lobbying) also reduce innovation of both new entries and incumbents, slowing down economic growth.

Chapter 6 focuses on the secular stagnation debate, and the authors aim to reconcile the pessimistic view of Robert J. Gordon (2016) and the optimistic view of Mokyr (2014). The introduction of the notion of secular stagnation by Alvin Hansen in 1938 was referred to the stagnation due to aggregate demand, similar to the reintroduction of the term by Larry Summers in 2007-2008. Nonetheless, for Robert Gordon secular stagnation is a supply-side notion, as the technological progress slows down, and he points out that the great innovations have already occurred. The authors subscribe to Mokyr's optimistic view and point out two reasons for it. "First, the IT revolution has not only improved the production of goods and services but has also durably and radically improved the technology for producing ideas. Second, globalization, contemporaneous with the IT wave, substantially increased the potential gains from innovating, due to a market size effect, and at the same time it has increased the potential losses from not innovating, due to a competition effect" (p. 105). The reasons are doubtless compelling, but the reader wonders what kind of a reconciliation that is. The

answer comes somewhat later, with the authors crediting the Nicholas Bloom et al. (2020) findings regarding decreasing returns and total factor productivity in R&D.

The crucial question is why there is no significant productivity growth, which should be expected with the IT revolution and globalisation. The authors' answer is the structural rigidity of many countries, inappropriate economic policies, and inadequate institutions. The reader concludes that basically, the fear of destruction leads governments to undermine creativity. Furthermore, the authors subscribe to the view that the easing of credit terms enabled inefficient firms to remain in the market. This is quite convincing, and this insight demonstrates the Darwinian function of competition – only efficient firms survive, others fail. Accordingly, the reader concludes that competition is not important only for innovations, as demonstrated in Chapter 4, but also for efficiency as many resources around the world (even in developed countries) are allocated inefficiently.

The blend of convergence, divergence, and the middle-income trap is one of the cornerstones of modern growth theory, so Chapter 7 is fully dedicated to it. The reader is introduced to the basic concept of convergence, with "club convergence" as a type of convergence that is supported by empirical evidence. What are the explanations of convergence? The first explanation is based on the diminishing returns from capital accumulation, a feature of the exogenous growth model (Rober Solow 1956). Nonetheless, there are substantial inconsistences in that explanation, such as the Lucas paradox, where capital does not flow to the countries with the highest returns. The authors subscribe to an alternative explanation, the one they claim is more Schumpeterian: convergence comes from less-advancing nations catching up to advanced nations by investing in technological imitation. There is a substantial "advantage of backwardness" in the process: the further a country is from the technological frontier, a greater the technological leap that can be accomplished, speeding-up economic growth. Hence the crucial convergence obstacle is the lack of property rights protection. If the innovators/imitators cannot appropriate rents from the technology transfer, they will not pursue the enterprise.

After analysing the levers of imitation-based and innovation-based growth, the authors demonstrate that the middle-income trap, i.e. the inability of a country to change its growth strategy from one type of growth to the other, is rooted in the lack of appropriate institutional reforms, since frontier innovation policies are quite distinctive from catch-up policies. The source of that institutional obstacle is by and large the behaviour of the incumbent firms, which would like to protect their rents and that is the reason for them to erect barriers to entry, i.e. to lobby for protection. A takeaway from this chapter is that the closer a country is to the technological frontier, the more important competition is for growth, and it is incumbent (large) firms that have an interest in undermining competition.

Chapter 8 focuses on an interesting question: can we circumvent industrialisation? It is evident that the service sector is nowadays dominant, especially its labour share, in advanced economies. The authors explain that development by both the supply side (Baumol's law: there is not much room for increasing productivity in services) and the demand side (Engel's law: with the increase in family income a smaller share is allocated to food consumption). The authors review a list of very convincing

arguments in favour of industrialisation, but then point out India, a country whose growth is based primarily on services. An important note at the end of this chapter is that services-based growth is much more environmentally friendly.

That is the perfect introduction to Chapter 9, which discusses environmentally sustainable growth. Quite expectedly, the authors frame this consideration with a creative destruction paradigm: it is about green innovation. The greatest obstacle for green innovation is found in path dependency: the rational decision of incumbent producers to innovate in the areas that they are good in. Combustion engine producers innovate in – combustion engines. The change of their decision can be induced by decreased demand for their products; in the case of combustion engines that can be achieved by punitive environmental taxes on fossil fuels. Nonetheless, as demonstrated by the Yellow Vest movement in France, this is hardly politically feasible. What are the rationale for and the scope of government intervention? According to the authors there are basically two rationales: negative environmental externality and path dependence of innovation. Hence, there should be two instruments of government intervention: carbon tax and subsidizing green innovations.

Chapter 10 opens the innovation black box. Up to this moment, it was only clear that innovation is endogenous – it depends on the decisions to invest in R&D – but the details of the process remained concealed. The first question is who becomes an inventor. In short, people with parents who have high income. It is not only the income; according to the authors, parental influence remains a decisive factor. More interesting from a policy point of view is the insight about the complementarity between educational policy and R&D subsides, and the answer to the question who should benefit from innovation within firms, as to set proper incentives for both firms and employees to optimise innovation efforts. Interesting is the debate about academic freedom at universities, as a precondition for basic research, and focused research in firms, as the proper framework for applied, targeted research that provides the grounds for development and commercialisation of new products and technologies.

The authors are aware that Schumpeterian creation is followed by destruction, so Chapter 11 focuses on the consequences of creative destruction on health and happiness. Yes, innovation destroys jobs and that creates unemployment and the loss of status. But innovations create new jobs. The crucial issues are the transition and the obstacles to the process. The authors identify some of them, like obsolescence of educational degrees. As for creative destruction and health, there are two sides. The bright one is the increase of the GDP *per capita*, which generates more funds for healthcare and increases life expectancy. The dark side is "death of despair", well elaborated by Anne Case and Angus Deaton (2020), widespread among white working class (with a high school degree or less) in America. The authors advocate the Danish model, known as flexicurity, combining the flexibility of the labour market (to enable creative destruction) and security for those who lost their jobs, without undermining incentives for them to retrain and find new jobs.

Chapter 12 is about financing creative destruction, considering the levers of financing in all the stages of creative destruction. The first lever is financing new, revolutionary ideas, with universities and governmental research agencies as the crucial mechanism. As for the financing of disruptive firms, those that innovate, create new

products and technologies, and destroys incumbents, the authors believe that the role of venture funds is crucial. Venture capital is a multistage financial contract. At first it grants the investor a large share of the firm's revenues and a veto right over the firm's decision. But in each successive stage, the investor progressively hands over control rights to the entrepreneur. According to the authors, this scheme is particularly well adapted to young innovative firms. Venture capitalists expect substantial capital gains when and if the innovation they funded this way produce results. It has been empirically demonstrated that the increase of employment and innovative activity of the firms supported by the venture capital. According to the authors: "This fact reflects the skill of venture capitalists both in selecting firms with high innovation and growth potential and then in providing guidance to these firms" (p. 238). The authors make an interesting distinction between venture funds in the United States and France. Venture capitalists in America are mainly former entrepreneurs who used to run innovative, high-risk endeavours, while in France they are mainly finance professionals. A second difference is that equity markets are much more developed in the US than in France, meaning that the IPO reward (capital gains) for US venture capitalists are much bigger than for their French counterparts. It is not surprising that in 2009, the total investments by French venture capitalists were only 7.8 per cent of the American. The reader understands that it is not only the case in France, but also in other parts of Europe and counts this as the one the reasons why European firms are not as innovative as American.

The following relevant topic is funding disruptive innovations in large firms. The crucial issue is the role of institutional investors. Based on US data, the authors "found a positive correlation between the percentage of a firm's capital held by institutional investors and the intensity of innovation in the firm" (p. 240). This finding is somewhat counterintuitive, as the authors initial hypothesis was that the correlation should be negative. Taking into account that the share of institutional investors' ownership of capital in publicly traded firms in the US increased from 9.4 per cent in 1970 to 61 per cent in 2005, perhaps this could be an explanation for US firms being more innovative than European firms, therefore a theoretical explanation of these counterintuitive empirical results should be offered. The answer provided by the authors is that institutional investors, unlike ordinary investors, can directly obtain information about the manager's ability. That is important because "if the institutional investor finds out that the manager is competent, then the manager will be shielded from the risks inherent in innovation" (p. 241). In other words, with institutional investors as capital owners, innovations are more probable.

Chapter 13 is about managing globalisation. Very precisely – managing. The authors do not have second thoughts about the benefits of globalisation and its sustainability. Nonetheless, they are meticulous in analysing the side effects of globalisation, which have proved to be substantial. The first one is Chinese import shock to the US and EU, with China joining the WTO in 2001. Manufacturing jobs have been destroyed, wages have fallen, and the impact on innovation is ambiguous. Nonetheless, the authors do not support increasing tariffs as a remedy but recommend that authorities encourage investment in innovation while reallocating resources and jobs from less productive to more productive firms. The reader concludes that as in every shock,

regrouping and restructuring are needed and, if that happens, in the long-run, the welfare level can be even higher than before the shock.

The creative destruction paradigm suggests that there is a market size effect that increases innovation rents. Hence the globalisation effect is positive: removing the trade barriers and growth of purchasing power around the world, due to economic growth, contributes to the market size effect. Furthermore, globalisation increases competition: according to the authors, that is good for the firms close to the technological frontier, strengthening incentives for them to innovate. The authors believes that the right way to deal with trade shocks is to provide incentives to domestic firms to innovate more, especially by subsidising investments in R&D, because "the resulting gains in productivity growth and in household consumption largely compensate the costs of the subsidies" (p. 263).

Movements of labour, i.e. international migrations, are another component of globalisation. The authors point out that European immigrants to the US turned out to be prolific innovators, but only after they spent several years in the country. Obviously, good human input produces outstanding results only when the environment is appropriate, and it takes time for innovators to ripe. Another source for this success is related to the idea that the authors subscribe that "a diverse population – consisting of qualified individuals who do not all come from the same country or region – also encourages innovation" (p. 270). Well, that is the American melting pot. Empirical evidence has demonstrated that immigrants are more enterprising, more determined, and more accepting to risk (all traits of innovators) than native-born Americans. The authors explain what accounts for that motivation. "First, a selection process: only the most enterprising and motivated individuals have sufficient desire and tolerance for risk to become immigrants. Second, the immigration process itself tends to foster a determination to succeed" (p. 270). Perhaps the European political elites can learn something out of it.

What should be the role of the state in harnessing the power of creative destruction is the topic of Chapter 14. The main role of the state regarding creation in the creative destruction paradigm is to support innovation. According to the authors, the reason for that is that within the free market economic agents tend to underinvest in knowledge and innovations. "The reason is that they do not take into account the positive externalities of their investments on future innovations" (p. 272). Accordingly, the authors conclude that what is needed is an "investor state". The main role of the state regarding destruction in the creative destruction paradigm is insurance: to protect individuals against unemployment, bad health and wellbeing outcomes that follow innovations. Accordingly, the authors conclude that what is needed is an "insurer state".

The authors are confident that law and order is not enough to generate innovation-led growth. The main reason is underinvestment in public education. It was the competition among European nations and military rivalry between them that made the governments improve public education and make it available for all, therefore the military capacity of the nations increased. The authors believe that globalisation is a sufficient challenge (no need for military conflicts) for governments around the world nowadays to keep the education incentive effective. The reader would possibly add that since virtually all governments around the world are investing in education, the

target is moving, and the educational results could be undermined at any moment, providing additional incentive to keep investing. As to the industrial policy, the authors consider the US DARPA (Defence Advanced Research Project Agency) a role model of public-private partnership for speeding up R&D. As to the insurance, the authors recommend comprehensive, a universal social security network, which should operate on the flexicurity principle: providing security to the people along with the flexibility of the labour market. The idea is to "make creative destruction more humane, while inducing individuals to remain active in the labor force" (p. 282). A few mechanisms to achieve this are considered, among them universal basic income, but none is recommended unconditionally. This is a testament that insurance policies have their costs, which are not only fiscal.

The last chapter is about creative destruction and the golden triangle: market-state-civil society. Ther interactions within the triad should make creative destruction effective and balanced. There are a few takeaways from this chapter. The state should not block creative destruction by introducing barrier to entry. Innovation needs democracy, not only because of freedom to go wherever inventors think they should go, but also to check the government and its tendencies to create barriers to entry. The role of the constitution is substantial in providing the grounds for basic democratic political institutions and separation of power, hence appropriate constitutional arrangements are indispensable. Unquestionably, independent judiciary is a substantial constraint to executive power, but that does not mean that an independent judiciary is infallible. With all the government failures and without a clear blueprint for sorting out issues regarding political institutions, the role of the civil society is indispensable. This is not exactly a master action plan, but even if such a plan is feasible and/or desirable, it should not be expected from a book of this kind. But the final chapter is exactly what is needed: a framework for considerations of future actions, as there are no simple solutions to the contemporary problems.

The authors properly end the book with a response to the question: "What is the future of capitalism?" by quoting the word of Henri Bergson: "The future is not what will happen to us, but what we will do" (p. 319).

The key word for this book is – serious. This is a serious book written by serious authors about serious topics. The book is extremely well written, so it is not difficult to read but it is demanding; it is energy and attention consuming. Again, a serious book. All the insights are based on the results of previous theoretical or empirical research. There is not one simple answer in the book. All the findings are checked and double checked, evidence is provided to support them, but also evidence against them, so the reader can conclude for his own. In some cases, the authors themselves are devil's advocates, aiming to provide the reader all the possible views on some issue.

There are no easy answers or ready-made solutions in this book. Instead, this book is a gastronomic festival of food for thought. This kind of book is rare today. In addition to the huge intellectual utility, that also makes it so valuable.

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