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NEW ECONOMIC DEVELOPMENT PATTERN: FROM A LINEAR TO A CIRCULAR ECONOMY, A CHALLENGE FOR EU'S ECONOMY

Abstract: *The endless global crisis which is continuing to have enormous effects in many economies, in particular in the EU, open a wide debate regarding the necessity to rethink our economic model based on the paradigm "take-make-dispose", in order to garantee a stable,efficient ans sustanable growth. The new model individuated is that of "circular economy" based on the paradigm of reuse the existing resources by closing the production loop.*

Such model will garantee saving of resources, economic growth, reduction of negative externalities and inderectily geoeconomic and geopolitic stability.

Keywords: *Circular economy – linear economy – resources – EU – Russia – new industrial revolution – economic growth – value creation – GDP – closing the loop – efficiency – price volatility – externalities – finance.*

Introduction

Since the economics became a science – social – all the problems related with the economic development (both at Country level as well as Regional and Global level), had to face the political side both as practical and theorethical terms. Often the joint study of these two disciplines have led to extraordinary results in term of innovation, welfare and development but we should not forget even the great consequences.

All the economic-political analyses had been – and still are – done under the assumption of a *linear economic model* which was founded in the period between the 1700 and 1800 under the influence of the industrial revolution; such model is based on the *take, make and dispose*.

Although such economic model have led us toward a great development at high rate and at global level, many social and enviromental consequences must be taken into account today.

The massive consume of resources, fossil fuels, the wide urbanization and the increase of global means of transport have contributed to create global negative effects (known as negative exernalities) and deep inequalities within each Country too.

Consciousness of consequences created by above factors led to a debate which interested not only accademicians but politicians and leaders too – see the EU – based on the necessity to find and implement an alternative economic model in order to satisfy the imminent need of reducing the negative enviroment impact without miss goals as growth and development.

The change have been individuated in the as called *"circular economy"* model (closed-loop recycling) which is founded more on the principle of materials recovery rather then waste, where the key of the productive process is " make more with existing resourses" (input) and not as have been postulated for many years " make more with less resources".

As we will see in the following pages, such model could represent a solution in term of GDP growth, innovation and income redistribution for households.

1. The concept of a Circular Economy

The notion of a circular economy has took place in the global arena in recent years. The concept is defined basically as an economy which is restorative and regenerative by design and aims to keep goods, components and materials at their highest utility and value at all the time[1]. The concept divides technical from biological cycles.

Such notion has deep historical roots; the idea of feedback,of cycles in real-world systems is ancient but enjoyed a revival only after the '50s with computer-based studies of non-linear systems. Many schools of thought related to the circular economy emerged in the 1970s but gained prominence in the 1990s.[2]

The term *circular economy* saw little use outside of China until 2010 where was proposed by schoolars in 1998 and formally accepted by the central goverment in 2002.[3] While the interpretation of the concept vary by the time, most emphasise different approaches to efficiency and materials recovery; in general we can say that material recovery approach can face a set of limitations.

As envisioned by the originators, a circular economy is a continuous positive development cycle that preserves and enhaces natural capital, optimises resourse yields, and minimises system risks by managing finite stocks and renewable flows.

The circular economy provides multiple value creation mechanisms that are decoupled from the consumpion of finite resourses. In a circular economy, consumption should happen only in

[1] Growth within : a circular economy vision for a competitive Europe.
[2] See : *W. R. Stahel,* The Performance Economy, Palgrave Macmillan, 2006.
W. McDonough, and M. Braungart, Toward a Sustaining Architecture for the 21st Century: The Promise of Cradle to Cradle Design, Industry & Environment, 2003. *P. Hawken, A. Lovins, and L.H. Lovins,* Natural Capitalism: Creating the Next Industrial Revolution, BackBay, 2008.
[3] Feng, Z. Circular economy overview. Beijing, China: People's Publishing House, 2004 (in Chinese).

effective bio-cycles : elsewhere use replaces consumption. Resourses are regenerated in the the bio-cycle or recovered and restored in the technical cycle. Mantaining or increasing capital has different characteristics in the two cycles.

In a diverse multi-scale system, restoration increases long-term resilience and innovation.[4]

The systems emphasis in the circular economy matters, as it can be a source of innovation and on the same time create new business and economic opportunities that add value, while generating social and enviromental benefits. The circular economy does not just reduce the systemic harm produced by a linear economy but it creates a positive reinforcing development cycle.

The circular economy rests basically on three principles and each of them address several of the resource and system challenges that Europe – and not only- currently faces.

The first of this principle[5] is to "preserve and and enhace natural capital by controlling finite stocks and balancing renewable resourse flows".

The sencond is to " optimise resource yields by circulating products, components and materials at highest utility at all the times in both technical and biological cycles" .

Third, " foster system effectiveness by releaving and designing out negative exernalities.

The mergering of these principles associated with the current and icreasing need to break down the wall of the global crises would lead in the end toward a development of a new patterns of growth.

2. Circular economy and sources of value creation.

The principles considered above offer not only a description of how the circular economy should work as a whole but provide also an outline of specific sources of core economic value creation potential.

Four are the principles of circular economy value creation considered and briefly described hereby, that is, *power of the inner circle, power of cicling longer, power of cascaded use and inbound material/product substitution and power of pure, non-toxic or a power of easer separation inputs and designs.*[6]

In general, the tighter the circles are, the larger the savings should be in the embedded costs in terms of material, labour, energy, capital and of the associated rucksuck of externalities. Given the inefficiencies along the linear supply chain, tighter circles will also benefit from a

[4] John Fullerton, Regenerative Capitalism: How Universal Principles and Patterns Will Shape Our New Economy, Capital Institute, 2015.
[5] For a complete overview of these principle see : https://www.ellenmacarthurfoundation.org
[6] Growth within : a circular economy vision for a competitive Europe. https://www.ellenmacarthurfoundation.org

comparatively higher virgin material substitution effect. This arbritage opportunity revealed by contrasting the linear to the circular setup is at the core of their economic values creation potential.

A second core value creation potential stems from keeping products, components and materials in use longer within the circular economy. This can occure by either going through more consecutive cycles or by prolonging the time within a cycle. This prologation will substitute virgin material inglows to counter the dissipation of material out of the economy.

Whilst the *power of cicling longer's* value creation levers refer to reusing identical products and materials within the circular setup for a specific product, component or material category, there is also an arbritage opportunity in the cascading of products,componets or materials across different product categories. In these cascades, the arbritage value creation potential is rooted in the lower marginal costs of reusing the cascading materiala s a substitute for virgin materia inflows and their embedded costs as well as negative externalities.

The power of the last major lever is a further enhancement to the above mentioned value creation potential and offers an additional host of benefits. To generate maximum value, each of the above levers requires a certain purity of material and quality of products and componets. Improvements to the product and reverse cycle process translate into further reductions of comparative costs of the reverse cycle.

3. An opportunity for economic growth.

We think that the GDP alone is not a adequate metrics of evaluation in today's world and sufficent enough to inform the paradigm shift. GDP as a measure does not capture many key dimensions of this innovative model (circular economy) as well as could not show the impact of this paradigm on consumer surplus, wealth distribution beyond averages, depletion of resourses, unpaid activities like commuting, enviromental costs, exernalities, depreciation and the value of leisure time.

Moreover, GDP measures have other limitations such as the use of expenditures to value non-market activities,

Despite that our analysis used the GDP to measure the impact a circular economy would have on growth, such choise is twofold, firstly because at this stage we need a simple and known tool to mesure the impact on the economy of a region, secondary because this is the language best understood by policy-makers and business leaders.

Considering that we are still at the beginning of the process toward the circularity and assuming that current ongoing process will lead to new profitable and more efficient options in

order to establish circular setups, we believe that a substantial scale-up from the current position is not only possible in theory but also highly likely in practice.

While a complete qualification of a likely "end-game" will require additional studies and papers, the case for a rapid value creation is quite strong. Eliminating waste – a key issue for the following generations - by "closing the loop" at industrial level - promises production costs saving and less resourse dependence. As we can see, the benefits are not only operational but also strategic; they do not involve only the industry but also users/consumers; and are not a merely a source of efficency but also source of innovation and growth, which is fundamental today.

If the circular business models would be applied at scale we are sure that the potential identified so far represent only a small fraction of what could be possible.

In our analysis we indentified three winners of circularity, such as economies, companies and consumers/users. Here we will briefly describe the keys point of how companies and consumers/user will win by shifting our linear into circular economy, to focus on the following paragraph on the effect for whole economy.

Companies will win by creating new profit pools and competitive advantage, building resilience against some of today's most strategic challenges, and expanding from their respective starting situations.

Consumers and users will win by gaining more choice, experiencing fewer hassles from premature obsolescnece, and enjoying improved service quality and secondary benefits.

4. How economies will win.

It is evident that reuse and improvements in design in a circular economy can significantly reduce the material bill and the expence of disposal. But the question is, from an economic perspective, can those savings produce a significant effect economy wide?

The circular economy represents an annual material cost saving opportunity of USD 340 to 380 billion p.a. at EU level for a "transition scenario" and USD 520 to 630 billion p.a. – equal to 3-4% of 2010 EU GDP – for the "advanced scenario, all net of the materials used in the reverce-cycle processes.[7]

Rather than trying to explicity model the effect of circularity for the entire economy – which is highly dependent on many factors such as industry structure and conduct, elasticities and so on – we decided to focus our estimate on the obseved potential material savings for the products from eight sectors - as cathegorised by Eurostat in its past analysis – such as, machinery and equipment,

[7]Data Source: Eurostat Input/Output tables 2007 for EU-27 economies.
http://ec.europa.eu/eurostat/statistics-explained/index.php/Supply_and_use_tables_-_input-output_analysis

office machinery and computers, electrical machinery and apparatus, comminication equipments and apparatus (TV, radio, etc.), medical precision and optical instruments, motor vehicles and similar, watches and clocks, and other manifactured goods.

We limited the scale up to those sectors that hold the most potential for mimicking the success of these products and that cointain products of medium-term usage periods – 3 to 10 years – so that adoption of circular design and processes could actually affect the material balance over the next fifteen years. These medium-lived products represent a little less than half of the contributions made by manifacturing to the EU's GDP today, but clearly they do not represent an exhaustive list of all short, medium and long-lived products that could be produced and delivered circularity.

Nevertheless, at this stage our analysis covers only material and energy savings , as the net economic benefit of this shifts in associated labour costs, redirection of investments, and the split of saving between users and providers or across players along the value chain would likely vary across sectors as well as regions therefore defies exact forecast.

We can say , however, that the order of magnitude identified for Europe confirms that we are looking at substantial opportunity at the economic level founded on structural and lasting shift – a resotrative circular economy.

Despite the focus on our analysis was oriented to the EU, we would expect a significant economic potential for circular business model even outside Europe. Many emerging economies are more material-intensive than advanced economies, and thus could expect even greater relative savings from circular business practices. However a projection on the size of potential and adoption rate will require more in-depth analysis given the high variance in strarting positions- collection rates in Europe tend to be higher than in other part of the world – and other different mix of economic activities.

Our analysis investigated how the circularity might affect of the mitigation of price volatility and supply risks. The figure shows the cosiderable effect that reducing downstream demand through circularity can have on upstream demand, especially by avoiding material loss due to inefficiencies alon the linear value chain. At the moment, the production of many raw materials falls at the far-right end of their respective cost curves, in some cases close to supply limits. The implication is frequent increases in pricing levels and volatility. As many studies show us, a further accelleration of demand pressure is likely as three billion consumers are expected to enter the market till 2030. This means that any shift leftwards on the respective cost curves could have a calming effect on volatility. However other factors such as speculative trading could still lead to some volatility.

Another aspect which we had investigated is the effect of circularity on the growth multiplier due to the sectorial shift and the possible employment benefetis.

Three main macroeconomic sectors, primary – extraction- the secondary – manifacturing – and the tertiary sector – services – would each have opportunities under the circular model – though the service sector would feel the biggest impact.

The increased need for financing and leasing arrangements for a wide swath of products and reverse cycle services, as well as the need to expand servises along the reverse cyclem would likely bring significant job growth in the tetriary sector.

If we consider the cases of developing economies which at the moment are more reliant on primary sector, this shift could be particualrly drammatic; net employement effect will vary across sectors.

Given the strong fundamentals of the underlying business case, adopting more circular business models would bring significant benefits, icluding improved innovation across the economy. Whilst, at the moment, the exact GDP implications of more innovation across the economy are quite difficult to quintify, the benefits of a more innovative economy include higher rates of technogical development, improved material labour, and energy efficency and more profit opportunities for companies.

According an estimation of Suez Enviroment by its controlled Sita Group, some 500,000 jobs have been created by the recycling industry in the EU[8] and we believe that this number could rise in case of adoption of a circular economy. Our ipothesis is renforced by another report from the Center for Manifacturing and Reuse which argued that workers in the U.K. remanufacturing industry were less affected by the recession in the late 2000s than were workers in other sectors.[9]

An important aspect which must be into consideration is the impact of reducing externalities.

The circular approach offers developed economies an avenue to resilient growth, a systemic answer to reducing dependency on resourse markets, it also provides a means to reduce exposure to resource price shocks – as we described above – and mitigate the need to absorb disposal costs – which consist of the loss of enviromental quality and the public costs for treatment that is not paid for by individual companies.

In addition to the economic bnefits, the exclusion of energy – or water intensive production steps as well as a move torwards less toxic material could contribute to reducing pressure on GHG emissions, water usage and biodiversity.

[8] French National Assembly, Rapport D'information N. 3880, October 26, 2011, p.75.
[9] Remanufacturing in the U.K. : a snapshot of the U.K. remanufacturing industry, Centre for Remanufacturing and Reuse, August 2010.

At last we can say that beyond its fundamental value creation potential over the next 10 to 15 years, a large scale transition to a circular economy promises to address fundamentally some of the economy's long-term challenges.

Improved material productivity, enhaced innovation capabilities, and a further shift from mass production employment to skilled labour, are all potential gains that will significantly increase the relisience of economies. They will also provide fundamental changes that would make it harder to revert back to the troubles of a linear " take-make-dipose" based economy.

We have also to do not underestimate the role of circular model in term of calming geoeconomic and geopolitic pressure - for the reasons described above – at global and regional level.

To Do not Conclude.

According many global based institutions and consulting company, with the information got and elaborated till today we could estimate that the European Union could save about 400 USD a year by rethinking – redesign – its production prosess/model torward a "circular economy" or a wasteless model. As mentioned in the previos section we such a shift would impact also on third countries such as Russia – for which a complete analysis will be provided in a further paper. Using the same methodology used for the EU's analysis we see that Russia currently consumes ten times more energy per unit of GDP than Germany and given such data we can assume that the impact of circularity could be even higher than in Europe – up to 15% in GDP increase. Such result is due becuase we had considered the current outdated infrastructure present on the Russian territory which needs to be replaced in order to garantee in any case – and it could conduct Russia to a aquire a leadership position in the new " industrial revolution".

On the other hand – due to its producer leadership – Russia could make a greatfull contribution to provide a solution to the global problem of resource scarcity which will be faced by emerging economies whose need to find new ways to cover current and future resources gap.