CIRCULAR ECONOMY AND TRADE: THE CHANGING PARADIGM FOR COMMERCIAL EXCHANGES BETWEEN COUNTRIES

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Introduction

Linear production is what we have always known. We extract resources through farming and mining. We transform them into goods and services. We sell them. We use them. And then, we scrap them. This model has marked the astonishing expansion of the world economy since the industrial revolution. But, it has also linked material prosperity to the extraction of resources, putting undue pressure on the environment (Kaya, 1993; Behrens et. al., 2007). As population increases, income raises, and the world attempts to eradicate poverty, demand for goods and services will only grow. To sustain development, decoupling growth from resource extraction becomes mandatory; and the circular economy serves as an important model to operationalize strategies towards this goal.

Every year, 1.2 billion tons of garbage are produced by 3 billion urban residents alone (WB, 2013). This is at the end-point of a massive linear economic flow, which starts when

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manufacturing uses 54% of the world's total delivered energy (EIA, 2016), especially in energy-intensive industries, such as petrochemicals, metals and paper. For an idea of quantities involved, every year 322 million tons of plastic, 59 million tons of aluminum – 53% of that by China alone - and 240 million tons of paper and paperboard are produced in the world (PlasticsEurope, 2016; World-Aluminium, 2016; FAO, 2016). A great part of this production goes to export markets and much of it is not recycled.

Contrarily to common belief, economic value isembedded in most goods atend-of-life cycle. An old t-shirt, a rusty container or an old mobile phone are examples of what ends up discarded, along with their transistors, metal structures, complex plastics and textile fibres. Those required a great deal of energy, time, land and capital to be produced. However, even when those products get obsolete, their components often do not. It is estimated that metals and plastics currently lost in e-waste could generate €48 billion worth of income (UNU, 2015).By the same token, value can be extracted from better asset and residue utilization. Washing machines – which use less water and energy – could be used by most people if they were leased instead of sold. Organic waste can be recovered or transformed into high-value animal protein through black soldier fly larvae (Nature, 2016). Food waste could be halved by food-sharing and food discounting models (USDA, 2015).

A circular economy involves markets that provide incentives to reusing rather than scraping and then extracting new resources. In other words, all forms of waste, such as used clothes, metal scrap and obsolete electronics could be sent back into the economy via recycling, remanufacturing and repurposing. By linking supply and demand more smartly, collaborative business models may enable use of empty space and help minimizing "virtual waste". In this sense, circular models are not only an opportunity to protect the environment, but also a way to save resources, develop new sectors, create jobs and generate income.

Shifting towards circular production and consumption requires new industrial and technological capabilities. New technologies emerging around the Industry 4.0 concept, such as production-on-demand and quick-evolving 3d printing, enable business models that are focused on producing what consumers want, instead of the conventional "full shelves" model in which costly

marketing is required to convince people what to buy (PWC, 2017). The material savings are potentially enormous if consumers can order exactly the model of t-shirt they want, instead of searching for dozens of pre-made models in search for a match (EEA, 2017).Repurposing and repairing consumer electronics also come with similar benefits but require proprietary know-how (e.g. source codes) whose access may be impeded by monopolistic behavior or intellectual property restrictions.

The benefits of the circular economy accrue to both developed and developing countries. Yet, the size of the "prize" which countries could obtain by adopting circular economy strategies is still a hot subject of research (Tearfund, 2016). Potential economic gains are estimated at over a trillion dollars a year in material cost savings (Hansen and Mulhall, 2012, EMF, 2014).Recent assessments for India, Laos and the EU estimated savings of USD 624 billion and EUR 320 billion respectively (UNCTAD, 2016; EMF, 2017). Greater circularity could also reduce depreciation of physical capital in the economy - creating income and jobs in the process.Less directly, countries may also tap into diversification and upgrading opportunities linked to the transition, giving birth to new forms of comparative advantage.

Changing trade patterns for better utilization of idle capacities

Circular models can help countries grow with resources existing in their own territories. For some, this might imply less cross-border trade. However, the circular economy would only change the nature oftrade patterns, enhancing value chains shaped around recycling and remanufacturing centres close to where products are used. Moving from linear to circular flows may skew value chains towards their end points, making the distinction between downstream and upstream blurrier. A reduced distance between production and consumption implies, at least theoretically, fewer transport-related losses, less emissions and less off shoring of jobs.

Circularity could change geographic patterns of trade, but the increasing demand for complex goods virtually guarantees growth in overall flows. While countries have been trying to preserve a degree of localization of production in their territories, international markets remain an essential source of consumption for most. Attempts to promote circularity get more challenging in complex products and in longer supply chains (EMF, 2014). With 140 million people joining the

middle class annually in the world, especially in Asia, demand for goods made in complex supply chains – such as electronics –tends to grow (Brookings, 2017). This will bring along new challenges developing economies shall timely address to succesfully tap into a global, more circular trade.

A key issue of circularity in trade is the utilization of idle capacities in shipping routes. As some countries export industrial products and others specialize in services, trade result in a net transfer of materials from one region to another. This can be exemplified by the US-China trade patterns, where the US imports many goods from China – it doesn't export nearly as much back. To fill shipping vessels on the return journey, 1500 containers every day are packed with scrap material for recycling (Waste360, 2016). This is a substantial movement: in 2016 those exports amounted to 16.2 million tons of scrap metal, paper and plastics worth $ 5.2 billion in 2016 (ISRI, 2017).

Growing WTO relevance

Many countries are understandably sceptical about imports of scrap materials and used goods. A recent curb on used clothes implemented by various East-African countries exemplifies this, on the basis that used textiles impede their local industry development and negatively impacts culture and dignity (NTY, 2017). Another good exampleis China's green fence operation, which sought to increase inspections to ensure quality of scrap coming into China for recycling (The Balance, 2016). The policy signalled to waste processors in exporting countries that their waste sorting practices needed to be improved. Much still needs to be done in the quality of scrap material, as a new WTO notification from China shows an intention to further restrict import conditions for scrap and waste materials (WTO 2017). This issue continues to be one of the top Technical Barriers to Trade (TBT) and Sanitary and Phytosanitary (SPS)Agreements in the WTO in 2018 (S&P Global, 2018).

Since trade agreements have been negotiated in the 1990s, the idea of circularity was not on the table, nor were climate concerns. In terms of trade regulation, the challenge lies in bringing the environment issues into trade negotiations and agreements. This has proven to be more challenging than one would expect. In the General Agreement on Trade and Tariff on (GATT), a

country can raise barriers to trade (e.g. tariffs, quotas, quantitative restrictions etc) to protect human, animal or plant life (Article XX, GATT). As of today, most of the barriers raised are justified under GATT (Article XX) and are exactly where residues and scrap materials used for circular economy falls in.

An example of Article XX's application, is the Dispute Settlement *Brazil – Tyres* (DS332) in the WTO, whereby Brazil banned the imports of retreated tires. Brazil's argument was that the transportation, accumulation and disposal of tires create health risks by providing locations in which the mosquito *Aedes Aegypti* can procreate, culminating in mosquito-borne diseases such as dengue fever, yellow fever and malaria. In short, the protection of health threatened by the mosquito-borne diseases outbreak lead to a ban on retreated tyres that could otherwise be recycled.

Brazil-Tyres case as well as restrict import conditions for scrap and waste materials in China demonstrate that waste management and recycling policies are paramount to avoid trade restrictions and at least partially offset linearity. The intersection between recycling, trade regulation and waste management policies can contribute to a change in trade patterns and leverage the benefits of circular economy to reduce CO2 emissions. Last but not the least, trade negotiations should include a preferential system to enhance and consolidate circular economy practices and methods that level the playing field in international trade.

Trade as a link between resource circularity and climate change mitigation

A linear economy is the mercantilism of residues accumulation. Until the 1800s, mercantilism guided world trade, seeking the accumulation of wealth (e.g. precious metals) through successive trade surpluses, in a tug-of-war approach considering the total wealth of the world to be static. With time, this vision was wisely replaced by a focus on specialization of production and comparative advantages, which alongside industrialization and the fossil fuel age made the world see exponential economic growth after the 1800s. Today, business patterns which lead to residue accumulation should also evolve.

Countries exporting residues should ensure those carry few contaminants and are optimally prepared for recycling processes. Countries importing recyclable materials should enable

policies to stimulate high-quality recycling and remanufacturing, which is safe for workers and the environment. It is also important to differentiate between waste, used and remanufactured goods, creating clear protocols for their acceptability. Keeping materials longer in the economy could reduce 33% the CO_2 emissions embedded in products, mitigating emissions at lower costs than other strategies, and helping countries in their Paris and SDGs commitments (McKinsey, 2003; Deloitte, 2016).

The world's largest global corporations are already incorporating circularity into their business. Of the top 100 largest global companies[4], 47% report having adopted eco-design models, paving the way to new pathways of material innovation. Some 28% already have e-waste repurposing mechanisms in place. Interestingly, a 1% increase in their recycling ratio - averaging 68% in 2017 - is associated with a 0.6% decrease in their environmental footprint.[5]Given the scale and cross-border nature of their operations, positive externalities to the environment and society may accrue to multiple locations. Yet, their ultimate effect will depend on the extent to which best practices will spread across value chains and become new standards. For this to happen, concerted policy efforts are neededat the intersection of trade, environment, industrial and education policy.

While heavily connected in their themes and consequences, however, climate change and trade negotiations do occur in separate fora. This happen for understandable reasons of simplification and management (Jegou et. al., 2012). The Paris Agreement adopted in 2015 institutionalized a forum on response measures, which serves as a formal space under the Paris agreement in which countries can discuss consequences their economies will likely face due to the adoption (by countries themselves or major trade partners) of mitigation and adaptation strategies. While not much explored in literature, circularity aspects can be a part of the forum on response measures, given direct connections with industrial upgrade and economic resilience/diversification (Cosbey, 2017).

[4] UNCTAD ranks the world's largest non-financial multinational enterprises (MNEs) by their foreign assets and publishes data on assets, sales and employment in two top 100 lists, respectively global and from developing and transition economies. The rankings are released on an annual basis as annex tables to the flagship *World Investment Report* (UNCTAD, 2018).

[5] Authors' analysis based on UNCTAD Top 100 MNEs (global list, 2017). Figures are calculated using data Thomson Reuters Eikon – ESG database for companies for which information was available. Data are 2017 or latest available year. "Environmental footprint" is measured as the environmental cost of revenue (unweighted average of the following four ratios: total waste to revenues; water use to revenues, energy use to revenues; co2 equivalent emissions to revenues). Data have not been cross-validated with company reports.

Trade bridges CircularEconomyand climate change mitigation

From	To
Renewables, energy efficiency and reduced deforestation	Low-carbon materials and dematerialization
Optimizing existing assets/installations	Building efficient marketsconnecting disposal and production systems
Plant, city or country	Supply chain or cross-border interaction
Products	Services
Carbon tax	Extraction tax
Territorial emissions	Consumption-based emissions
UNFCCC's Article 6 inspired by CDM and offsetting	UNFCCC's Article 6 targeting cross-border trade of carbon-intensive products and materials

Source: Authors' elaboration based on the Stanley Foundation (2017)

Prices play an important role too. Consumers usually pay a premium to consumegreen goods, such as renewable energy and organic vegetables, compared to their "brown" counterparts. While in some contexts disassembling/restoring can be prohibitively costly, in other countries it can make economic sense. In those cases, when recycled inputs are used, the resulting products can be cheaper than conventional goods. Lower commodity prices in secondary markets are an important contributor to this dynamic, as well as environmental regulations, evolving consumer preferences and carbon pricing – all of which converge to make circular cheaper.

Given the number of markets, jurisdictions and complex value chains present in a global economy of 7.5 billion people, solutions cannot be engineered top-down or through multilateral negotiations alone. Rebalancing national incentives – and orchestrating those actions across different jurisdictions - is therefore important to tilt value chains towards circular patterns of trade. The following areas highlight opportunities for trade to act as an engine for greater circularity:

1. **Incentives for reduction, reuseandrecycling ofwaste streams:** Any wasted resource represent a cost to the economy, be it "physical" like scrap metal or old electronics in a landfill, or abstract like empty rooms or unused seats in moving cars. Driving value chains away from such losses requires incentives aimed at transforming linear supply chains to circular ones. Examples include, but are not limited to: rebalancing taxation - from consumption and production to extraction and disposal, addressing possible market failures (economic losses), setting national and international standards and providing new innovation policy instruments (waste-driven innovation, eco-design).
2.

Tools for circularity promotion
Command and control instruments
Standards for waste disposal and trade
Minimum recycling requirements and standards
Deposit refund systems (e.g. PET bottles)
Circular public procurement
Extended legal warranties
Economic instruments
Landfill / incineration / disposaltaxes
Different taxation schemes for reused or recycled products
Reduced VAT rates for repair and reuse activities
Increased taxes on non-reparable products
Tax shift from labour to resources
Public-Private instruments
Public funding and streamlined regulation for leasing and sharing business models
Embedding circularity into CSR
Extended Producer Responsibility Schemes (EPR)

Discounts for efficiency
Specific investment platforms
Product design for recycling

Sources: Authors' elaboration based on EEB (2012), EMF (2015) and Stanley Foundation (2017)

3. **Enable collaborative sectors to emerge** – Supply and demand should be allowed to meet in smarter ways. For that, services are essential, as technology breaks information barriers. Examples include car-sharing, space and machinery renting (residential, office, industrial), food sharing and similar areas that empower individuals and businesses to diversify and increase their incomes while tapping on underutilized or otherwise wasted assets. A recent study estimates that the revenue growth of these platforms has been dramatic. In the European Union (EU) for example, the total revenue from the collaborative economy increased from around 1 billion euros in 2013 to 3.6 billion euros in 2015.[6]

4. **Rethinktrade under a circularity framework**– Circularity calls for an important bridge between trade in goods and trade in services: Instead of owning a product (such as a car, washing machine or printer), the quality, energy efficiency and durability of those products tend to be higher when function is delivered as a service.A leased printer, shared car or communal washing machine in a building tend to be more robust and efficient than a privately-owned one. This "*servicification*" of the economy should be monitored closely by competition policy, as the malaises of anti-competitive practices can be equally present in circular business models just as in linear ones.

5. **Encourage consumer education, awareness and behavioural shifts**- Circularity will not be achieved only by a compelling case, national policies or even business commitments alone. It ultimately depends on individuals and their capacity, willingness and interest to

[6]http://www.pwc.co.uk/issues/megatrends/collisions/sharingeconomy/future-of-the-sharing-economy-in-europe-2016.html

adopt and use the practices and technologies which realize such opportunities. This includes technological literacy and the integration of circular concepts in school and university curricula. In consumer markets such as garments and apparel it is important to encourage cultural shifts, removing undue stigma around second-hand or recycled products. Similarly, an effort should be made tode-link social status from ownership, but instead drive customers towards quality public or shared mobility, or choice of repair instead of buying new. In the essence of the goal set forth by SDG 12 on Sustainable Consumption and Production, we need to move from consumers who want to have, to consumers who want to be.

Conclusion

With the proper alignment of enablers in various markets, as well as shifting consumer preferences, a circular economycan be an important contributor to goals set in the Paris Agreement and the SDGs. Its potential cannot be realised without the facilitation of international trade. As a global economy, we need to move from a mercantilist model of resource trade – where some nations accumulate materials which are costly to reprocess in their territories – to a model in which resources flow back to regions which comparative advantages for their recycling. Negotiating agreeable conditions for all countries to do so it essential to make circular economy the core of our growth strategies.

The soft power of trade and commercial dialogue is more important than ever to promote dissemination of successful policies across markets. Greater recycling could reduce demand for primary resources extracted from nature, requiring a rebalancing in employment, logistics as well as taxation structures in countries dependent on natural resource extraction. On the other hand, the emergence of regional reprocessing and recycling hubs could open new opportunities for developing countries and promote innovation in commodities and manufacturing sectors. Conducive policies and well-functioning educational systems – which bring about IT literacy - will be essential in this regard, to allow entrepreneurs to implement and develop new business ideas which can tap on idle and discarded resources.

It is likely that markets will soon start adopting circularity standards and labelling. This will present new challenges for companies and governments, as conventional lifecycle assessments used in most sustainability standards do not account for the "next life" of materials when they are recycled into other products. As illustrated by current disputes involving scrap materials trade, more clarity and standardization will be needed to allow companies, recyclers and governments to create enabling conditions for greater regional and global circularity. The multilateral trade community can play an important role in this process.

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