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The circular economy

as a de-risking strategy
and driver of superior
risk-adjusted returns



This white paper is the result of a collaboration between Bocconi University, Ellen MacArthur Foundation, and Intesa Sanpaolo.

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Contents

- 4 Executive summary**
- 6 Part 1**
The circular economy is increasingly recognised as a value creation opportunity for the financial sector
- 11 Part 2**
A circular economy has a de-risking effect and drives superior risk-adjusted returns
- 17 Part 3**
Case study: How Intesa Sanpaolo is taking advantage of the effect of circular economy on risk and return
- 22 Glossary**
- 23 Acknowledgements**
- 24 Disclaimer**
- 25 Endnotes**

Executive summary

As the market for circular economy financing is rapidly taking off, questions around the relationship between circular economy, risk, and return are increasingly pertinent.

This white paper demonstrates, with new Bocconi University analysis, that circular economy strategies can curb investment risk and drive superior risk-adjusted returns.

As a case study, Intesa Sanpaolo provides inspiration on how financial institutions can capture this circular economy opportunity.



The circular economy is crucial to deliver on goals related to climate change and other global challenges, while offering new and better growth opportunities.

Moving past today's extractive 'take-make-waste' linear model, the circular economy offers a positive vision of an economy in which waste and pollution are eliminated, products are designed to be reused, repaired, or repurposed, and natural systems are regenerated. It is a framework for system solutions and transformation that builds long-term resilience, generates business and economic opportunities, and provides environmental and societal benefits. More and more companies are adopting circular economy practices to take advantage of the multi-trillion-dollar opportunity that they represent, and as a way of minimising risks and futureproofing their businesses.

The financial sector is increasingly seizing the circular economy opportunity, with dedicated financing activity growing steeply. The last two years have seen a steep increase in the creation of debt and equity instruments related to the circular economy, including public equity funds, corporate and sovereign bonds, venture capital, private equity, and private debt, as well as bank lending, project finance, and insurance. For example, assets under management (AUM) in public equity funds focussed on the circular economy have grown from USD 0.3 billion in December 2019 to over USD 8 billion at the end of the first half of 2021.

This paper is the result of a collaboration between Bocconi University, Ellen MacArthur Foundation and Intesa Sanpaolo, Strategic Partner of the Foundation since 2016, and offers new evidence on risk and performance. It suggests that the circular economy has significant potential for addressing key risks faced by businesses operating in today's linear economic system. New research and analysis by Bocconi University on risk and return metrics, in relation to both debt and equity assets, strengthens the case for

investing in companies that are undertaking a circular transition. Specifically, the paper finds that:

- 1. The circular economy can be used as a de-risking strategy.** Analysis of 222 European companies across 14 industries has highlighted that the more circular a company is, the lower its risk of default on debt over both a one-year and five-year time horizon.
- 2. Investing in the circular economy can also drive superior risk-adjusted returns.** Research suggests that higher levels of circularity are driving superior risk-adjusted stock performance for European listed companies.

Potential drivers of these circular economy benefits include a focus on design and business model innovation and diversification, achieving greater resource decoupling, anticipation of stricter regulation, and changing customer preferences.

Recognising the circular economy as an innovative and strategic challenge, Intesa Sanpaolo has embedded circular economy in the Group's business planning since 2018. In this paper, Intesa Sanpaolo, with expertise provided by Intesa Sanpaolo Innovation Center, offers a case study on how financial institutions can seize the circular economy opportunity. To take advantage of this de-risking effect and better risk-adjusted performance, Intesa Sanpaolo has integrated circular economy approaches into its strategic plan and developed its expertise and capabilities on the topic. It has adopted proactive circular economy credit policies and lending strategies, including the launch of a dedicated EUR 6 billion credit Plafond, and is actively engaging with international institutions, businesses, and academia to support the development of the circular economy market. Moreover, it is exploring how to integrate the circular economy framework into its credit risk assessment process.

Part 1

The circular economy is increasingly recognised as a value creation opportunity for the financial sector



The circular economy is crucial to deliver on goals related to climate and other global challenges, while offering new and better growth opportunities

Today's take-make-waste economy is hugely wasteful, and its shortcomings are becoming more apparent by the day. We take finite resources from the ground to make products, which we often use for only a short time, and then throw away. For example, every minute one garbage truck of plastic is dumped into our oceans,¹ and every second one garbage truck of clothes is landfilled or incinerated.² In a business-as-usual

scenario, this linear model will lead to a doubling of global material extraction between 2015 and 2060.³ Such an extractive economy amounts to billions of dollars of value being wasted in raw materials and energy, underutilised assets, and disposal costs. As well as leading to significant economic value loss, this system is the root cause of global challenges, such as climate change, biodiversity loss, and pollution.

BOX 1 | THE CONCEPT OF A CIRCULAR ECONOMY

The circular economy is a framework for system solutions and transformation that tackles the global challenges of climate change, biodiversity loss, and pollution. It is based on three principles, all driven by design: eliminate waste and pollution; keep products and materials in use; and regenerate natural systems. Based increasingly on renewable energy and materials, and accelerated by digital innovation, the circular economy is distributed, diverse, and inclusive.

The circular economy decouples economic value creation from resource consumption and environmental degradation by redefining how we

make and use goods. It spurs innovation, creates value, and builds resilience through a range of strategies and levers, including product redesign for longevity and repairability, digital-enabled resale and sharing platforms, remanufacturing, material innovation, and regenerative production practices.

Restorative and regenerative by design, the circular economy presents opportunities for better growth, creating solutions at speed and at scale. It is a bigger idea that goes well beyond merely addressing the symptoms of today's wasteful and polluting linear economy.

Eliminate waste and pollution



Keep products and materials in use



A circular economy has three principles, driven by design



Regenerate natural systems

The circular economy is crucial for achieving global climate targets. While a shift to currently available renewable energy sources can address 55% of global greenhouse gas emissions, the remaining 45% of emissions are linked to the way we make and use products, and how we grow food. The circular economy can play a major role in reducing these emissions.⁴ For example, circulating products made from steel, aluminium, and plastic, and maintaining the energy that went into making those materials – instead of producing new ones – can help cut energy demand. In agriculture, adopting circular economy principles is an effective way to enable carbon to be stored in the soil.

The circular economy also contributes to tackling pollution, rebuilding biodiversity, and achieving other UN Sustainable Development Goals (SDGs). As well as being core to the delivery of SDG12 *Sustainable consumption and production*, the circular economy delivers benefits across a further 11 SDGs, including SDG14 *Life below water* and SDG15 *Life on land*.⁵ For example, applying circular economy

principles can help address the 90% of biodiversity loss and water stress caused by resource extraction and processing.⁶

The Covid-19 crisis has revealed our current economic system's exposure to a variety of risks and reinforced the relevance of the circular economy. Through business model diversification and the decoupling of economic growth from resource use and environmental impact, the adoption of circular practices reduces the likelihood of, and increases resilience against, future shocks – opening up a path to a resilient recovery.

More and more companies are already innovating towards the circular economy to reduce costs, increase revenues, and manage risks. By adopting circular economy design and business models, these businesses are capturing new opportunities, meeting the changing preferences of their customers, and mitigating their exposure to market risks, such as commodity price fluctuations and extended linear supply chain risks.

BOX 2 | CASE STUDIES

SIGNIFY

Signify's 'pay-per-lux' model offers customers lighting as a service. Signify retains ownership of their products and charges customers not per lightbulb, but per light-hour, incentivising design for durability, easy repair, reuse, and recycling. For example, Schiphol Airport Amsterdam (Europe's fourth busiest airport) has opted for this model in its terminal buildings, expecting to cut its energy consumption in half.⁷



RENAULT

Renault offers remanufactured components and spare parts with as-good-as-new warranties to customers for prices 40% lower than for brand new parts. Production of remanufactured parts typically uses 80% less energy, 88% less water, 92% less chemicals, and generates 70% less waste than an equivalent new part. Renault also offers battery leasing arrangements for their electric vehicles, reducing upfront cost for the customer and enabling Renault to reuse, or optimise recycling of, the batteries after use. Through their all-electric car-sharing service, ZITY, Renault are increasing utilisation of valuable resources.⁸



The circular economy has already started transforming entire industries, which creates new opportunities, as well as risks for those who lag behind. For example, in the fashion industry, clothing resale is expected to be twice as big as fast fashion by 2030;⁹ and in plastics and consumer packaged goods, profit pools along the value chain are being transformed by increasing regulation, public pressure, and innovation.

Governments are also increasingly recognising the potential of the circular economy framework to increase competitiveness, develop more resilient supply chains, and deliver on societal and environmental objectives. For example, the circular economy is a key pillar of the European Green Deal and one of the six environmental objectives of the EU Taxonomy, and several countries have put circular economy roadmaps and legislation in place, including China, Chile, and France.

The financial sector is already seizing the circular economy opportunity

Financial services activity in the circular economy has risen steeply in the last two years. For example, the number of public equity funds dedicated to the circular economy have grown from two in 2018 to 13 funds in 2021, including funds by leading institutions, such as BlackRock, BNP Paribas, Credit Suisse, and Goldman Sachs. Combined assets under management in these funds has grown to over USD 8 billion,¹⁰ a 26-fold increase since December 2019 (Figure 1), demonstrating the potential for circular economy-related financial products to attract capital inflows.

There has also been a significant increase in debt capital market activity. Over 35 corporate and sovereign bonds have been issued to finance circular economy activity since the beginning of 2019, underwritten or supported by banks, such as Barclays, BNP Paribas, HSBC, ING, and Morgan Stanley, among others (Figure 2).

FIGURE 1
Assets under management in public equity funds with a circular economy focus have grown 26-fold since 2019

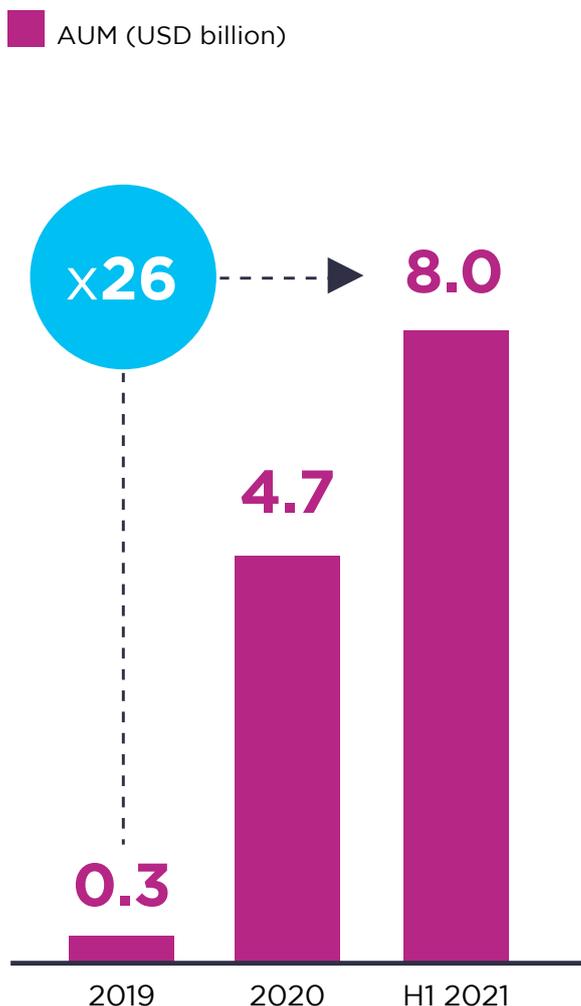
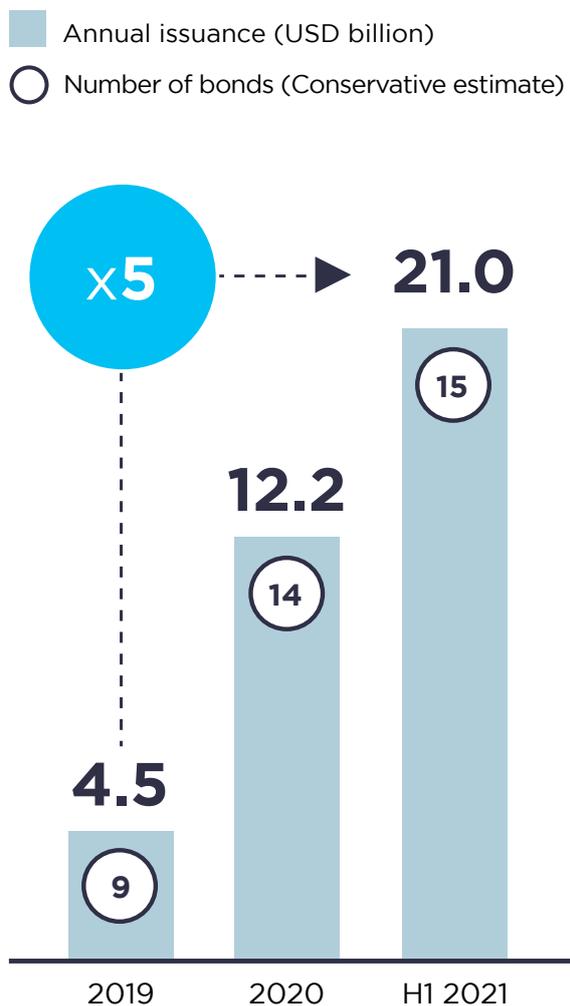


FIGURE 2
Issuance of corporate and sovereign bonds focussed on circular economy has grown more than five-fold since 2019



A similar trend can be seen for private market funds investing in circular economy activities, including venture capital, private equity, and private debt, as well as bank lending, project finance, and insurance.

For example:

- Intesa Sanpaolo launched a EUR 6 billion circular economy credit facility;
- Morgan Stanley launched a firm-wide Plastic Waste Resolution to prevent, reduce, and remove 50 million tonnes of plastic waste from entering the environment by 2030;
- The European Investment Bank (EIB) partnered with five of Europe's largest national promotional banks and institutions to launch a EUR 10 billion loan and investment initiative dedicated to the circular economy; and
- Insurance firms, including AXA, are developing new solutions for circular business models, such as peer-to-peer sharing.

There is positive early evidence on circular economy investment performance. While the track record is still limited, initial products and services give a good indication of how the circular economy can become a value driver for the financial sector. In the first half of 2020, on average circular economy-related public equity funds performed 5.0 percentage points better than their Morningstar category benchmarks – indicating how the circular economy can deliver excess returns.¹¹

Future research will be required to see whether outperformance persists over time. An important part of developing the evidence base is improving future data quality and availability, which requires scaling dedicated circularity measurement tools, such as Circulytics, and integrating circularity metrics into leading existing non-financial reporting frameworks.¹²



Part 2

**A circular economy has
a de-risking effect and
drives superior risk-
adjusted returns**



New research by Bocconi University has shown that a company can reduce its probability of defaulting on debt and drive superior risk-adjusted returns on its stock by adopting circular economy practices.¹³

In this research, a sample of publicly listed companies has been analysed, looking into the link between the degree of circularity and two key financial concepts:



The probability of defaulting on debt for companies with an external credit rating, to investigate whether the adoption of circular economy practices can reduce risk, as measured by the issuer's probability of default, both short and long term¹⁴



The risk-adjusted returns of public equity to investigate whether the adoption of circular economy practices can drive superior risk-adjusted returns, as measured by the Sharpe Ratio and Treynor Ratio¹⁵

Drivers of these circular economy benefits include progressive decoupling from virgin resource extraction, business model diversification, increasing policies and regulation, and improved natural capital management.¹⁶ For example, circular economy design and business model innovation in the plastics and packaged goods industry provides an opportunity at the same time as reducing risk, as customers increasingly reward brands offering solutions to plastic pollution. Circular business models also enable companies to anticipate stricter regulation, such as single-use plastic bans, trade restrictions, Extended Producer Responsibility (EPR) or mandatory recycled content targets, for example the EU Single-Use Plastics Directive and China's National Sword policy.

ANALYSIS 1

The circular economy has a de-risking effect on debt

KEY INSIGHTS

The research suggests that:¹⁷

- **The more circular a company is, the lower its risk of defaulting on debt, over both a one-year and five-year time horizon;**
- **This relationship is causal: a higher level of circularity is associated with a lower probability of default; and**
- **The level of circularity is a significant driver of this de-risking effect**

DETAILS

The analysis results reveal that a 0.1 increase in Circularity Score¹⁸ reduces the probability of default on debt over a one-year horizon by 8.63% (Figure 3), and over a five-year horizon by 4.93% – with a 95% confidence level in both analyses.^{19,20} Figure 4 shows that the top 25% of companies in the sample with the highest Circularity Score have an average probability of default of 0.04% over a one-year time horizon, compared to 0.5% for the 25% with the lowest Circularity Score. Over a five-year time horizon, the average probability of default for the top quartile was 0.91%, compared to 2.35% for the bottom quartile.²¹

To investigate whether circularity is driving the de-risking effect, or the other way around, the relationship between degree of circularity and probability of default was investigated after introducing a one-year time lag. The analysis used the previous year’s Circularity Score data from 2013–2017 in combination with 2014–2018 data for the short- and long-term probability of default, alongside the control variables. Applying this lagged model, an increase in Circularity Score continues to yield a decrease in both

FIGURE 3

The more circular a company is...



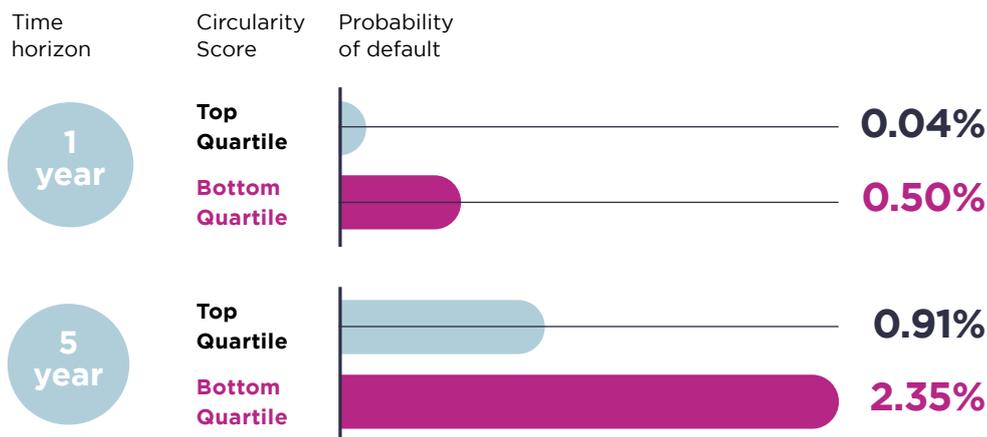
...the lower its risk of defaulting on debt



the one-year and five-year probability of default (by 9.01% and 5.37%, respectively), suggesting that circularity is a key driver of the de-risking effect.²³

To better understand the role played in the de-risking effect by the degree of circularity compared to other factors, a dominance analysis was carried out to assess the impact of the ten variables considered. The resulting ranking demonstrates the relevance of a company’s circularity in reducing its exposure to default risk. The Circularity Score ranks 4th in terms of relative importance over a one-year time horizon, after return on assets (1st), sector (2nd), and interest coverage ratio (3rd) – all of which exert a widely recognised influence on the probability of defaulting on debt. The dominance analysis also shows how circularity becomes even more relevant in the long run, with the Circularity Score climbing to 3rd in the ranking for the five-year probability of default, displacing interest coverage ratio.

FIGURE 4
Comparison between the mean values of default risk based on the Circularity Score distribution, segmented by quartiles²²



ANALYSIS 2

The circular economy drives superior risk-adjusted returns for public equities

KEY INSIGHTS

The research suggests that:²⁴

- **The more circular a company is, the higher the risk-adjusted returns of its stock**
- **This relationship is causal: a higher level of circularity is associated with superior risk-adjusted returns**

DETAILS

The analysis results show that an increase in a company’s circularity implies a higher Sharpe Ratio and Treynor Ratio for its stock, with a 99% confidence level in both cases. Looking at the Sharpe Ratio, a 0.1 increase in the Circularity Score results in an 0.204 increase in the absolute excess return per risk unit of a stock on a standalone basis (Figure 5). A similar pattern can be witnessed for the relative excess return per risk unit of a stock considered in a fully diversified portfolio, with a 0.163 increase in Treynor Ratio for a 0.1 increase in the Circularity Score. Figure 6 shows that the top 25% of companies in the sample with the highest Circularity Score generated a greater excess return per unit of systematic risk compared to the 25% with the lowest Circularity Score, with an average Treynor Ratio of 0.22 and -0.73 respectively.²⁵

To investigate whether circularity is driving the superior risk-adjusted returns, or the other way around, a one-year time lag has been introduced in the analysis, using Circularity Score data from 2013–2017 in combination

FIGURE 5

The more circular a company is...



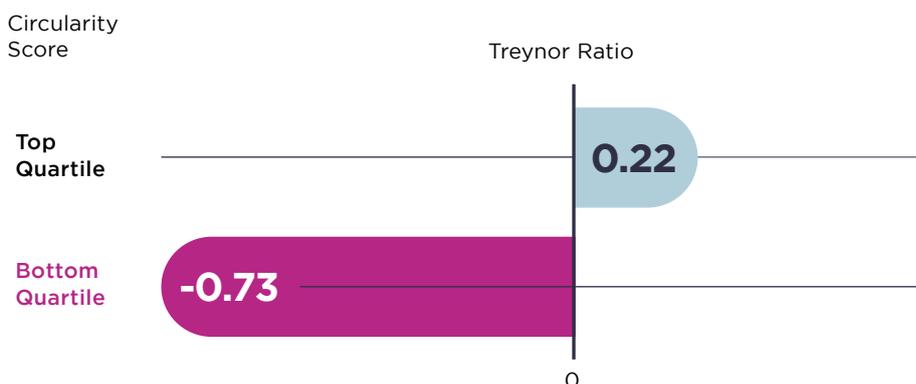
...the higher the risk-adjusted returns of its stock



with 2014–2018 data for the Sharpe Ratio and Treynor Ratio, and the control variables. Applying this lagged model, an increase in the Circularity Score continues to drive an increase in both the Sharpe Ratio and the Treynor Ratio by 0.133 and 0.103, respectively, suggesting that a higher degree of circularity drives superior risk-adjusted performance, considering a stock either on a standalone basis or in a fully diversified portfolio.

FIGURE 6

Comparison between the mean values of risk-adjusted performance based on the Circularity Score distribution, segmented by quartiles²⁶



BOX 3 | RESEARCH SCOPE & CIRCULARITY SCORE

This research considers companies in resource-intensive industries, such as the manufacturing sector, utilities, real estate, and construction materials (with some exclusions), headquartered in the EU-15 area, plus Switzerland.^{27,28,29} The initial sample comprised 1,130 companies for the period 2013–2018. Excluding companies which did not disclose information needed to assess their degree of circularity, the final sample comprised 222 companies across 14 industries.

To measure the degree of circularity of each company on a yearly basis for the period 2013–2017, the Circularity Score has been developed by Bocconi University and Intesa Sanpaolo, using existing ESG data and sustainability measures often used by investors. Out of the 180 indicators in the Thomson Reuters Eikon ESG 2019 dataset, 140 have been identified as relevant to the circular economy. They fall

into five categories related to resource usage and recovery, the end of a product's useful life, and the company's commitments and responsibilities in relation to their products. The Circularity Score is calculated at industry level as the weighted average value (on a 0–1 scale) of the category scores for these five categories, which are computed using the underlying indicators. The score is then adjusted by applying the SASB Materiality Map,³⁰ which provides financial materiality for the most relevant topics in each sub-industry.

Alongside the Circularity Score, a set of control variables associated with a company's risk and return profile were considered, including company size and capitalisation, profit margin, capital structure, and R&D expenditure, among others.



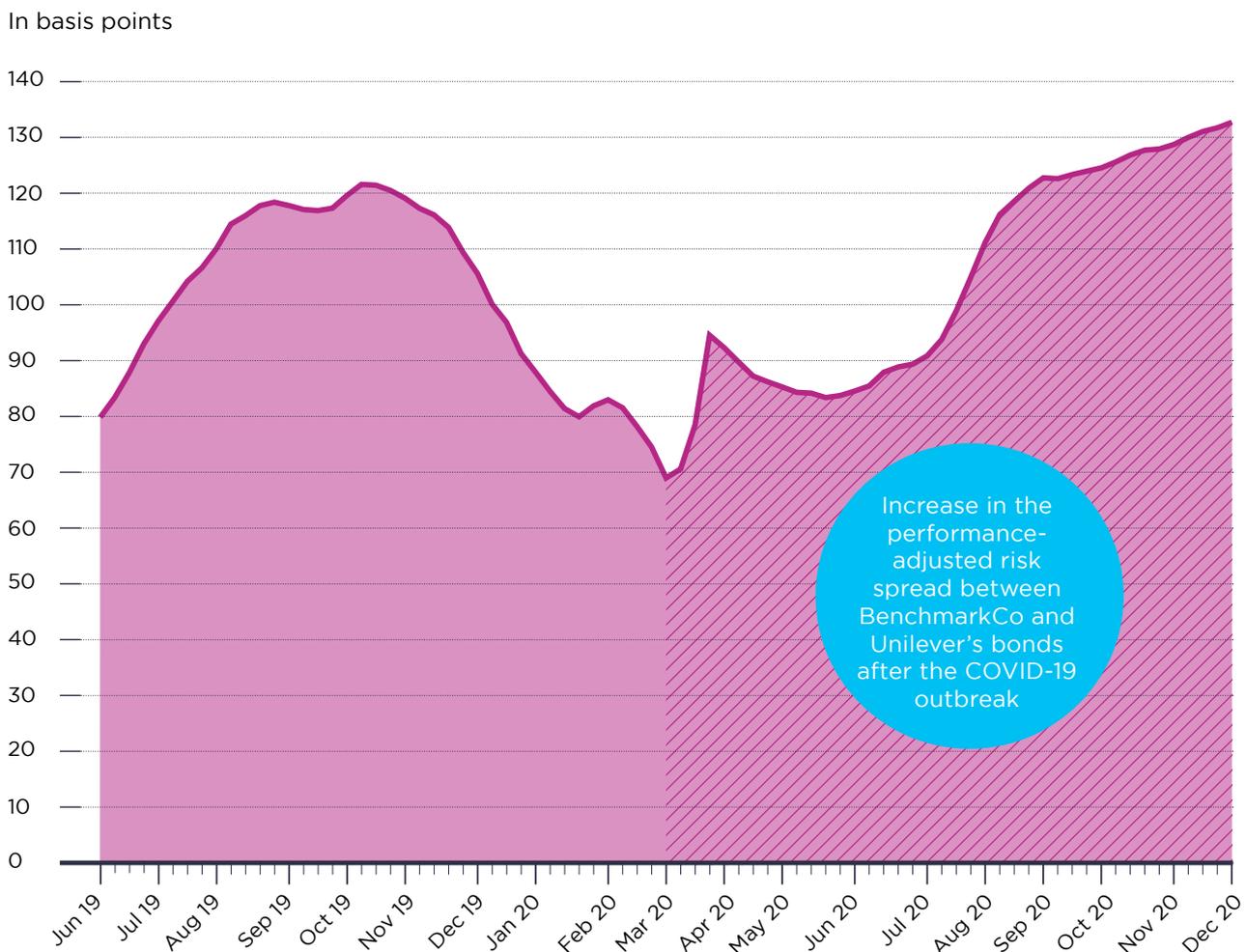
Case example: Resilience in response to the Covid-19 economic shock

The Covid-19 pandemic has revealed our linear system’s exposure to a variety of risks. To investigate the resilience and de-risking effects of a circular economy approach in response to the external economic shock from the Covid-19 outbreak, the variation in five-year bond prices over 2020 was compared for two companies, with differing levels of circularity, in the food and beverage industry.³¹

Unilever, a company which has made commitments and taken action towards a circular economy, particularly in plastic packaging, was compared to a company (‘BenchmarkCo’) in the same industry with a significantly lower Circularity Score.^{32,33}

Using the Coefficient of Variation as a measure of the performance-adjusted risk, Unilever’s five-year bond exhibited greater resilience than BenchmarkCo’s comparable security. There has been a slower increase in Coefficient of Variation after the Covid-19 pandemic shock at the beginning of March 2020, shown by a sharp increase in the spread between the bonds (Figure 7). In addition, the positive spread over the whole period shows that Unilever’s bond is considered less risky in absolute terms than BenchmarkCo’s.³⁴

FIGURE 7
The spread between the Coefficient of Variation of 5-year bond prices for BenchmarkCo and Unilever



Part 3

Case study: Intesa Sanpaolo



How Intesa Sanpaolo is taking advantage of the effect of the circular economy on risk and return

Bocconi University's research presented in the previous chapter supports the idea that companies that adopt circular business models could reduce their risk profile. This chapter explores how a financial institution can take advantage of this circular economy de-risking effect and better risk-adjusted performance in practice, through the example of Intesa Sanpaolo, one of the largest banking groups in Europe, headquartered in Italy. Intesa Sanpaolo has pursued circular economy strategies as a value creation opportunity for several years, including through its partnership with Bocconi University.

To seize the circular economy opportunity Intesa Sanpaolo has taken four key actions:

1

Setting circular economy as a strategic priority

2

Innovating in financial products and adopting proactive circular economy credit policies and lending strategies

3

Actively supporting the development of the circular economy market

4

Exploring the integration of circular economy into risk assessment models

“

Companies that shift towards a circular model can increase their medium- to long-term competitiveness, becoming more appealing to financial institutions in terms of funding and financial support, while creating a positive impact within local communities

”

Carlo Messina
CEO, Intesa Sanpaolo

1

SETTING CIRCULAR ECONOMY AS A STRATEGIC PRIORITY

“Back in 2017 we already understood that the circular economy had to become one of the main business pillars of the bank”

ACTION

OUTCOME / BENEFIT

Intesa Sanpaolo has included the circular economy in its Strategic Plan as a key driver to strengthen the bank’s competitiveness and generate positive impact.

Integration of the circular economy into Intesa Sanpaolo’s Strategic Plan:

- informs commercial and marketing strategies
- supports the development of innovative financial products tailored to the circular economy
- helps Intesa Sanpaolo to position itself as a circular economy leader in the financial services industry

Intesa Sanpaolo has launched educational programmes to improve knowledge and understanding of the circular economy across the different departments of the bank.

Upskilling managers and increasing circular economy knowledge across the bank helps to implement circular economy strategies more effectively.

2

INNOVATING IN FINANCIAL PRODUCTS AND ADOPTING PROACTIVE CIRCULAR ECONOMY CREDIT POLICIES AND LENDING STRATEGIES

“The bank has an interest in evaluating and selecting the most circular companies because there is an awareness of the fact that they are more resilient in the long term.”

ACTION

OUTCOME / BENEFIT

Intesa Sanpaolo has set up the Plafond, a dedicated EUR 6 billion credit facility (extended in 2020 from an initial EUR 5 billion) for innovative companies with business practices aligned to circular economy principles. The Plafond is available to all sizes of companies, with a focus on Italian small and medium-sized enterprises (SMEs).

Directing credit exposure towards circular companies and projects offers Intesa Sanpaolo the potential to de-risk and stabilise its portfolio and increase resilience in the medium- to long-term. The Plafond also responds to client demand for financial products which support a low-carbon circular economy.

Out of around 540 applications reviewed since the launch of the credit Plafond, 194 had been funded by the end of March 2021, for a value of more than EUR 3.4 billion. Examples of funded projects span sectors (Figure 8), and include the substitution of virgin materials with recycled materials, the production of compostable fabrics with dyes made from agricultural waste, and the recovery of urban organic waste to produce compost, with biomethane production and CO₂ recovery.

FIGURE 8
Loans by sector funded through the Plafond
 as of 31 March 2021

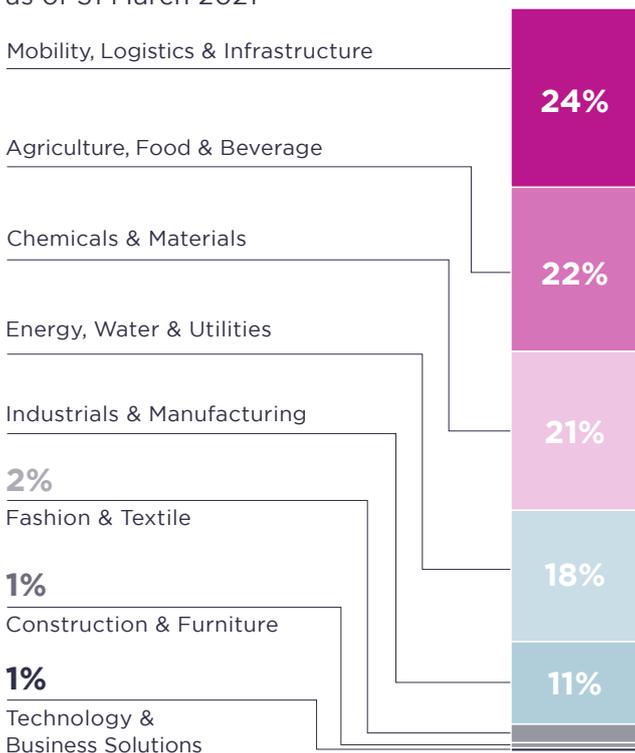
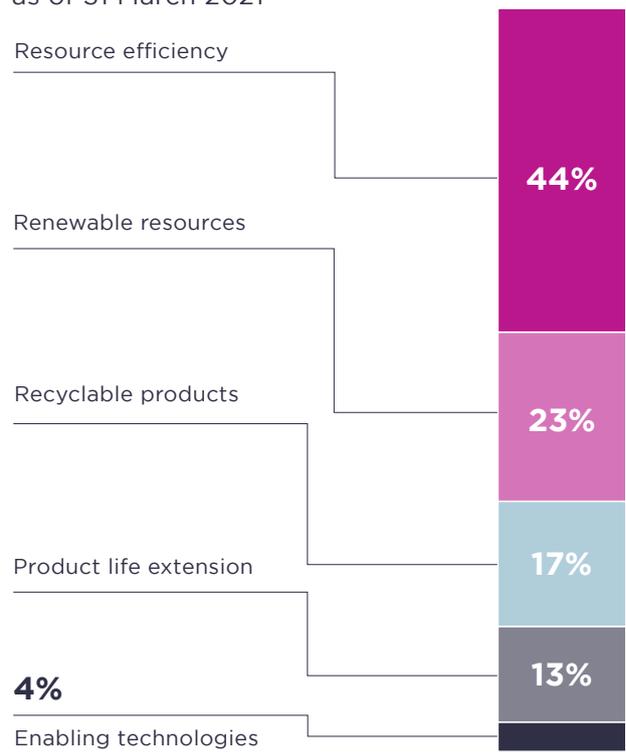


FIGURE 9
Loans by circular economy eligibility criteria funded through the Plafond
 as of 31 March 2021



The Intesa Sanpaolo Innovation Center has developed circular economy eligibility criteria and KPIs to support screening and selection of projects for the Plafond as part of the credit process (Figure 9). Financed projects are granted advantageous credit terms, lowering the companies' costs of capital.

By offering favourable conditions and having rigorous circular economy selection criteria, Intesa Sanpaolo is creating an economic incentive for companies to adopt circular practices and helping to stimulate circular economy activity in the market.

In the future, the risk and performance of loans from the Plafond could offer additional evidence of the benefits of integrating circular economy investments into a loan portfolio.

Intesa Sanpaolo has published a Green, Social and Sustainability Bond Framework to enable the issuance of circular economy-focussed bonds. The circular economy is one of the Green Eligible Use of Proceeds Categories, with projects evaluated using the eligibility criteria developed for the Plafond.

The bond framework reinforces the relevance of the circular economy concept for the ESG and green agendas of mainstream capital market investors.

Intesa Sanpaolo issued a EUR 750 million sustainable bond in 2019 under its bond framework, with the proceeds allocated to financing circular economy companies and projects through the Plafond.

Demand for the bond exceeded EUR 3.5 billion (four times the issued quantity). The success of this circular economy-focussed bond enabled diversification of Intesa Sanpaolo's investor base, with 70% of the ~200 orders received coming from pure ESG investors. This allowed Intesa Sanpaolo to curb its cost of funding, compared to a traditional bond issuance.

3

ACTIVELY SUPPORTING THE DEVELOPMENT OF THE CIRCULAR ECONOMY MARKET

"We believe that rethinking financial instruments is a key factor in supporting the redesign of the industrial ecosystem and the role of the Innovation Center is precisely to facilitate this re-thinking process, working closely with the Group's internal and external stakeholders."

Maurizio Montagnese, Chairman, Intesa Sanpaolo Innovation Center

ACTION

OUTCOME / BENEFIT

The Intesa Sanpaolo Innovation Center has established the Circular Economy Lab in Milan, in collaboration with Fondazione Cariplo. The Circular Economy Lab supports the circular transformation of corporates and SMEs through education and circular open innovation programmes.

The Circular Economy Lab supports emerging entrepreneurs and innovators in the co-design of new circular economy business models that are both transformative and bankable. This helps to develop a potential pipeline of projects, which the bank could ultimately invest in or finance through the Plafond.

Intesa Sanpaolo is active at institutional level as a member of the Circular Economy Financing Expert Group, which supports the European Commission on finance issues.

The aim of the Expert Group is to identify the most effective strategies and tools to facilitate and encourage the transition to a circular economy.

In partnership with Bocconi University, Intesa Sanpaolo is working to better define the impact of the circular economy on finance and its de-risking effect.

This work helps build the evidence base for the opportunity the circular economy presents for the financial services industry.

4

EXPLORING THE INTEGRATION OF CIRCULAR ECONOMY INTO RISK ASSESSMENT MODELS

"We are organising ourselves to be able to identify circular elements that can be standardised and structured in the credit assessment process."

ACTION

OUTCOME / BENEFIT

Intesa Sanpaolo is deepening its understanding of the de-risking effect of the circular economy and refining the risk assessment process. This could involve the development of new risk assessment methodologies or the integration of relevant circular economy aspects into existing methodologies and credit rating models.

Integration of circular metrics into risk assessment processes and models could enable Intesa Sanpaolo to more accurately assess the benefits of circular business models, as well as the risks and potential negative externalities associated with linear business models, steering Intesa Sanpaolo's lending strategies in favour of more circular counterparties.

Glossary

Market Beta

A measure of 'systematic' risk. It expresses the sensitivity of the price of a single stock to changes in a portfolio endowed with the highest possible degree of diversification, theoretically encompassing every alternative equity investment. In practice, the latter is proxied by a market index. The greater the absolute value of Beta, the higher the sensitivity of that stock to market fluctuations.

Sharpe Ratio

A performance metric used to help investors understand the return on an equity investment, on a standalone basis, compared to its risk. The ratio is the average return earned in excess of the risk-free rate per unit of volatility (measured by the standard deviation of returns). In general, the higher the value of the Sharpe Ratio, the more attractive the risk-adjusted return on that investment.

R_i = return on the security

R_f = risk-free rate

σ_i = standard deviation of the returns on the security

$$\text{Sharpe Ratio} = \frac{R_i - R_f}{\sigma_i}$$

Treynor Ratio

A performance metric that, unlike the Sharpe Ratio, considers the asset as part of a fully diversified portfolio rather than standalone. Hence, the definition of 'risk' relates only to the systematic component, measured by the market Beta. The higher the Treynor Ratio, the more attractive the risk-adjusted return on that investment within a fully diversified portfolio.

R_i = return on the security

R_f = risk-free rate

β_i = market Beta of the security

$$\text{Treynor Ratio} = \frac{R_i - R_f}{\beta_i}$$

Coefficient of Variation

A pure number that expresses the performance-adjusted risk of a security: that is, its volatility per unit of average return. Volatility is measured as the standard deviation of returns, which is a measure of 'total risk' as it encompasses both the systematic and the idiosyncratic components. All other things being equal, the higher the Coefficient of Variation, the less attractive that security is to a risk-averse investor.



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Bocconi provides undergraduate, graduate, and post-graduate education (PhDs, MBAs, and executive programmes), in addition to a range of double degree programmes, in the fields of economics, management, finance, law, political science, data science, and public administration. SDA Bocconi, the university's business school, offers MBA and Executive MBA programmes. GREEN Research Centre is active in the field of independent research on climate change, transportation, environmental policy, energy markets, and circular and sustainable finance.

About the Ellen MacArthur Foundation

The Ellen MacArthur Foundation is an international charity, committed to the creation of a circular economy that tackles some of the biggest challenges of our time, such as climate change and biodiversity loss. Driven by design, a circular economy eliminates waste and pollution, keeps products and materials in use, and regenerates natural systems, creating benefits for society, the environment, and the economy.

Further information:

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[@circulareconomy](#)

About Intesa Sanpaolo

The Intesa Sanpaolo Group is one of the largest banking groups in Europe and is committed to supporting the economy in the countries in which it operates, specifically in Italy where it is also committed to becoming a reference model in terms of sustainability, and social and cultural responsibility. Intesa Sanpaolo is the leader in Italy in all business areas (retail, corporate, and wealth management). The Group offers its services to 14.7 million customers through a network of approximately 5,300 branches distributed throughout the country, with a market share of greater than 12% in most Italian regions. Intesa Sanpaolo has a strategic international presence, with approximately 1,000 branches and 7.1 million customers, comprising subsidiaries operating in commercial banking in 12 countries in Central Eastern Europe and Middle Eastern and North African areas. Intesa Sanpaolo also has an international network of specialists which support corporate customers across 26 countries, particularly in the Middle East and North Africa, and in areas where Italian companies are most active, such as the United States, Brazil, Russia, India, and China.

Endnotes

- 1 World Economic Forum, Ellen MacArthur Foundation, and McKinsey & Company, [The new plastics economy: rethinking the future of plastics](#) (2016)
- 2 Ellen MacArthur Foundation, [A new textiles economy: redesigning fashion's future](#) (2017). Based on an average density of 150kg/m³ for a bale of textiles and a volume of 17.5m³ of a garbage truck
- 3 International Resource Panel (IRP), [Global resources outlook 2019](#) (2019)
- 4 Ellen MacArthur Foundation – Material Economics, [Completing the picture: how the circular economy tackles climate change](#) (2019)
- 5 IRP, [Resource efficiency: potential and economic implications](#) (2017)
- 6 International Resource Panel (IRP), [Global resources outlook 2019](#) (2019)
- 7 Signify, [Case study: Schiphol Airport Amsterdam](#)
- 8 BusinessEurope Circular, Renault remanufacturing of spare parts; Groupe Renault, All you need to know about battery leasing for the Renault Zoe; Groupe Renault, Car sharing: Zity arrives in Paris
- 9 thredUP (GlobalData Market Sizing), thredUP 2021 resale report (2021)
- 10 As of 31 June 2021, analysis by the Ellen MacArthur Foundation
- 11 Ellen MacArthur Foundation, [Financing the circular economy: capturing the opportunity](#) (2020)
- 12 Ellen MacArthur Foundation, [Circulytics](#)
- 13 Since 2019, Bocconi University has been carrying out independent research on the opportunities of the circular economy for the financial services industry, with the support and cooperation of Intesa Sanpaolo
- 14 An external credit rating is provided to issuers of securities that receive an assessment of their debt creditworthiness – a credit risk rating – by third-party credit rating agencies
- 15 Public equity refers to shares traded in capital markets, such as stock exchanges
- 16 C. Zara, Circular economy and finance: opportunities for the financial services industry (2020) in A. Pettinaroli (ed.), *Transformative economies: from the circular economy to the Green New Deal* (Fondazione Giangiacomo Feltrinelli)
- 17 The findings presented in this section are based on the paper: C. Zara and S. Ramkumar, Circular economy and default risk (2020), presented at the IS4CE Conference, 6-7th July 2020, University of Exeter
- 18 See Box 3 for the methodology underlying the Circularity Score calculation
- 19 A company's Circularity Score has a value from 0 to 1, yet typically ranges from 0.2 to 0.6 in the sample of 222 companies analysed
- 20 As a worked example, if the one-year probability of default for a company's debt is 10%, a 0.1 increase in the Circularity Score yields an 8.63% reduction in the original 10%, resulting in an improved probability of default of 9.137%
- 21 These results cannot be used for predictive purposes, nor should they be generalised or considered as if the dependent variables were driven solely by the Circularity Score
- 22 The model in this analysis considered multiple factors that could affect the probability of default. Therefore, these results cannot be represented as a linear relationship, as the latter would rely on the unlikely assumption that all other factors remain constant
- 23 Results show that the relationship between Circularity Score and short-term probability of default retains its statistical relevance with the lagged model, with a 95% confidence level, and show an even higher statistical significance, with a 99% confidence level, for longer-term probability of default
- 24 The findings presented in this section are based on the paper: C. Zara, M. Iannuzzi, and S. Ramkumar, The impact of circular economy on public equity in Europe: understanding de-risking effect and risk-adjusted performance (2020), presented at the 19th International Conference on Credit Risk Valuation, 24-25th September 2020, Ca' Foscari University of Venice and at the 4th International Conference on Social Impact Investment, 4th December 2020, University of Rome "La Sapienza"
- 25 These results cannot be used for predictive purposes, nor should they be generalised or considered as if the dependent variables were driven solely by the Circularity Score
- 26 The model in this analysis considered multiple factors that could affect the Sharpe Ratio and Treynor Ratio. Therefore, these results cannot be represented as a linear relationship, as the latter would rely on the unlikely assumption that all other factors remain constant
- 27 Resource-intensive industries have been selected as they are exposed to several sources of volatility, such as supply chain disruptions, shortages of virgin raw materials, volatility in virgin raw material prices, environmental externalities, and changes in related legislation
- 28 Exclusions refer to tobacco, weapons, ammunitions, and military fighting vehicles
- 29 The UK is included in the EU-15 sample, as that label denotes the countries that were Member States between 1st January 1995 and 30th April 2004. The UK withdrew from the EU on 31st January 2020
- 30 Refer to the SASB Materiality Map on the SASB website
- 31 The analysis in this case example was carried out using a different methodological approach compared to the previous analyses. It is an example of a broader set of single company-level comparisons across different industries, which provided similar results in favour of circular companies
- 32 In 2019, Unilever had a Circularity Score of 0.54, compared to 0.37 for BenchmarkCo
- 33 For the comparable analysis, the trend and the absolute levels of different time-varying parameters have been investigated for both Unilever and the BenchmarkCo. Time-varying trends were compared by aligning figures with respect to date, expressed as the Friday on each trading week. Unilever: GBP-denominated, 1.125% coupon, issued on 2nd February 2017 and maturing on 3rd February 2022. BenchmarkCo: callable, USD-denominated, issued on 7th June 2018 and originally maturing on 15th June 2023, callable and actually redeemed on 3rd June 2020. Both bonds were analysed from their respective listing date on the secondary market to 4th December 2020. As 52 observations are needed, the first date for which both bonds had data to calculate the Coefficient of Variation was 7th July 2019
- 34 This evidence must also be considered in light of a negligible difference, in favour of Unilever, between the two companies' long term credit rating class. The bonds issued in both cases were investment-grade.



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