

RISK MANAGEMENT MAGAZINE

Anno 15, numero 3
Settembre – Dicembre 2020



In collaborazione con



IN QUESTO NUMERO

4	Corporate Default Forecasting with Machine Learning Mirko Moscatelli, Simone Narizzano, Fabio Parlapiano, Gianluca Viggiano
15	Modelli di business e modelli manageriali della banca. Dal rischio di business model al rischio strategico. Verso una revisione del framework dei rischi bancari? Maurizio Baravelli
29	Pandemic risk: operational aspects Camilla Bello, Stefano Desando, Veruska Orio, Paolo Giudici, Barbara Tarantino
ARTICLE SUBMITTED TO DOUBLE-BLIND PEER REVIEW	
33	The resilience of green stocks during COVID-19: a clustering approach Giovanni Maria Bonagura, Luca D'Amico, Alessio Iacopino, Lorenzo Prosperi, Lea Zicchino
48	Climate Change: EU taxonomy and forward looking analysis in the context of emerging climate related and environmental risks Giuliana Birindelli, Vera Palea, Luca Trussoni, Fabio Verachi
65	Critical analysis of the most widespread methodologies for the simulation of the short rate dynamics under extreme market conditions Pier Giuseppe Giribone
73	Blockchain securitization: an innovative technology to boost asset liquidity Valerio Begozzi, Francesco Dammacco, Paolo Fabris, Gianmarco Fagiani, Chiara Frigerio, Riccardo Rostagno, Angelo Santarossa

Rivista scientifica
riconosciuta da
ANVUR e AIDEA



Risk Management Magazine

Anno 15 n° 3 Settembre – Dicembre 2020

Direttore Responsabile (Chief Managing Editor)

Maurizio Vallino

Condirettore (Deputy Managing Editor)

Corrado Meglio

Editorial Board

Giampaolo Gabbi - Chief Editor Business Economics Area (SDA Bocconi); Paolo Giudici - Chief Editor Statistical Economics Area (Università di Pavia); Daniel Ahelegbey (Università di Pavia); Raffaella Calabrese (University of Edinburgh); Robert Eccles (Oxford University); Franco Fiordelisi (University of Essex); Pier Giuseppe Giribone (Università di Genova); Gulia Iori (London City University); Richard M. Levich (New York University); Michèle F. Sutter Rüdiger (University of San Gallen); Peter Schwendner (ZHAW Zurich University of Applied Sciences); Alessandra Tanda (Università di Pavia).

Scientific Committee

Arianna Agosto (Università di Pavia); Ruggero Bertelli (Università di Siena); Paola Bongini (Università Milano Bicocca); Anna Bottasso (Università di Genova); Marina Brogi (Università La Sapienza di Roma); Ottavio Caligaris (Università di Genova); Rosita Cocozza (Università di Napoli); Costanza Consolandi (Università di Siena); Simona Cosma (Università del Salento); Paola Ferretti (Università di Pisa); Andrea Giacomelli (Università di Venezia); Adele Grassi (Vice Presidente APB); Valentina Lagasio (Università La Sapienza di Roma); Duccio Martelli (Università di Perugia); Laura Nieri (Università di Genova); Pasqualina Porretta (Università La Sapienza di Roma); Anna Grazia Quaranta (Università di Macerata); Enzo Scannella (Università di Palermo); Cristiana Schena (Università dell'Insubria); Giuseppe Torluccio (Università di Bologna).

Vignettista: Silvano Gaggero

Proprietà, Redazione e Segreteria:

Associazione Italiana Financial Industry Risk Managers (AIFIRM), Via Sile 18, 20139 Milano

Registrazione del Tribunale di Milano n° 629 del 10/9/2004

ISSN Print 2612-3665 – ISSN Online 2724-2153

DOI 10.47473/2016rrm

E-mail: risk.management.magazine@aifirm.it; Tel. +39 389 6946315

Stampa

Algraphy S.n.c. - Passo Ponte Carrega 62-62r 16141 Genova

Le opinioni espresse negli articoli impegnano unicamente la responsabilità dei rispettivi autori

SPEDIZIONE IN ABBONAMENTO POSTALE AI SOCI AIFIRM
RESIDENTI IN ITALIA, IN REGOLA CON L'ISCRIZIONE

Rivista in stampa: 22 dicembre 2020

Peer review process on papers presented for publication

The papers that are presented to our magazine for publication are submitted anonymously to a double level of peer review.

The first level is a review of eligibility, implemented on the paper by the members of the Scientific Council, who assess the adequacy of the paper to the typical topics of the magazine.

The second level is a review of suitability for publication, implemented on the paper by two referees, selected within the Scientific Council or externally among academics, scholars, experts on the subject who assess the content and the form.

Editorial regulation

“Risk Management Magazine” is the AIFIRM (Italian Association of Financial Industry Risk Managers) magazine, fully dedicated to risk management topics.

The organization includes the managing director, a joint manager and a Scientific Council composed by academics; the Council guarantees the quality and accuracy of the published articles.

The magazine promotes the diffusion of all content related to risk management topics, from regulatory aspects, to organizational and technical issues and all articles will be examined with interest through the Scientific Council.

The papers shall be presented in Microsoft Word format, font Times New Roman 10 and shall have between 20.000 and 100.000 characters; tables and graphs are welcome.

The bibliography shall be written in APA format and shall accurately specify the sources.

An Abstract in Italian and one in English are required (less than 1200 characters) highlighting the Key words.

The authors bear sole responsibility for the opinions expressed in the articles.

The Statement on ethics and on unfair procedures in scientific publications can be found on our website www.aifirm.it.

Processo di referaggio degli articoli proposti per la pubblicazione

Gli articoli che sono proposti alla rivista per la pubblicazione sono sottoposti in forma anonima a due successivi livelli di referaggio.

Il primo livello di referaggio (di ammissibilità) viene effettuato sull’articolo dai membri del Consiglio Scientifico che ne valutano la congruità ai temi trattati dalla rivista.

Il secondo livello di referaggio (di pubblicabilità) viene effettuato sull’articolo da due referee scelti all’interno del Consiglio Scientifico o all’esterno tra accademici, ricercatori, esperti della materia, che ne valutano il contenuto e la forma.

Regolamento redazionale

“Risk Management Magazine” è il periodico di AIFIRM (Associazione Italiana Financial Industry Risk Managers) ed interamente dedicato ai temi del risk management.

La sua struttura organizzativa prevede, oltre al direttore responsabile, un condirettore e un Consiglio Scientifico formato da accademici; quest’ultimo è garante della qualità e correttezza degli articoli pubblicati.

La rivista favorisce la diffusione di tutti i contenuti afferenti i temi del risk management, dagli aspetti normativi a quelli organizzativi e alle technicalities e vaglierà con interesse, per mezzo del Comitato Scientifico, i contributi che le perverranno.

Gli articoli proposti dovranno pervenire in formato Microsoft Word carattere Times New Roman 10 ed avere un numero di battute compreso tra 20.000 e 100.000; è gradita la presenza di tabelle e grafici.

La bibliografia deve essere redatta in formato APA, specificando accuratamente le fonti.

Si richiede la predisposizione di un Abstract in lingua italiana e in lingua inglese (meno di 1200 battute) con indicazione delle Key words.

Le opinioni espresse negli articoli impegnano unicamente la responsabilità dei rispettivi autori.

Sul sito www.aifirm.it è pubblicata la Dichiarazione sull’etica e sulle pratiche scorrette nella pubblicazione dei lavori scientifici.

Blockchain securitization: an innovative technology to boost asset liquidity

Paolo Fabris (Partner Advantage Reply); Valerio Begozzi (Manager Advantage Reply); Angelo Santarossa (Manager Advantage Reply); Francesco Dammacco (Collaborator Advantage Reply); Gianmarco Fagiani (Consultant Advantage Reply); Riccardo Rostagno (Consultant Blockchain Reply); Chiara Frigerio (Università Cattolica del Sacro Cuore di Milano)

Article submitted to double-blind peer review, received on 10th November 2020 and accepted on 18th December 2020

Abstract

The main aim of this paper is to show the potential benefits for the Securitisation process, both in terms of the setup of operations and in the entire product life cycle, derived from the adoption of the Blockchain Technology. For this purpose, we focused on the different aspects, starting from the securitisation market in which we analysed the causes of the decrease in the number of operations occurred in the last decade, although there still is a strong need to securitise some types of assets such as NPL's and Trade Receivables. Specifically, for these two types of assets we represent the securitisation process with the As-Is limits and improvements made possible by the blockchain technology application. Along this "path" we have deepened some key aspects of the blockchain and how the application of this technology may help Financial Institutions to experience a strong reduction in operational risks and costs, liquidity risk and credit risk on managing the underlying assets. At the same time, the new framework might give to a wider category of individuals access to a product that otherwise would have been available only to a limited number of more sophisticated investors, tapping from more structured, controlled and certified information. All this being achieved at no additional costs but rather with stronger and more organized and transparent product structures.

Keywords

Blockchain Benefits, Securitisation Process, STS Framework, NPL, Trade Receivable, Illiquid Asset, Data Quality, Data Security, Data Certification (Oracles), DLT, Smart Contract

1. Introduction

1.1 Illiquid Assets

Over the past few years, the interest towards the management and monitoring of illiquid investments has increased between both financial and private market participants, as they seek for higher risk adjusted returns after the urgent monetary stimulus, introduced during the Financial Crisis, which pushed high quality interest rates to record lows. Therefore, it is significant to highlight the main aspects which discriminate them from traditional financial assets.

The main sources of illiquidity are (TAFOLONG & TEDONGAP, 2017):

- *Transaction costs*: which usually affect more short-term investments than long-term investments and have greater influence on trading frequency
- *Market organization*: the absence of a secondary market could cause the lack of trading partners at any given point of time which give rise to liquidation costs whereas complexity and weak comparability related to transactions may lead to a significant distortion of asset characteristics
- *Discrepant evaluations for the same asset*: difference in opinions about the real/fair value of an asset as a result of:
 - information asymmetry – heterogeneous information between traders and their respective counterparties (AKERLOF, 1970)
 - divergence in expectations - different forecasts of the future cash flow and riskiness
 - divergence in used possibilities – the interest in assets is influenced by individual needs and valuations (i.e., arts/collectible)

The market value of the main categories of illiquid assets was about \$400 trillion in 2018, with the dominance of allocations in real estate class taking about half of the market share, followed by credit, derivatives, equity shares and residual categories of arts/collectibles and cryptocurrencies, as reported in the figure below (CeTIF, 2020).

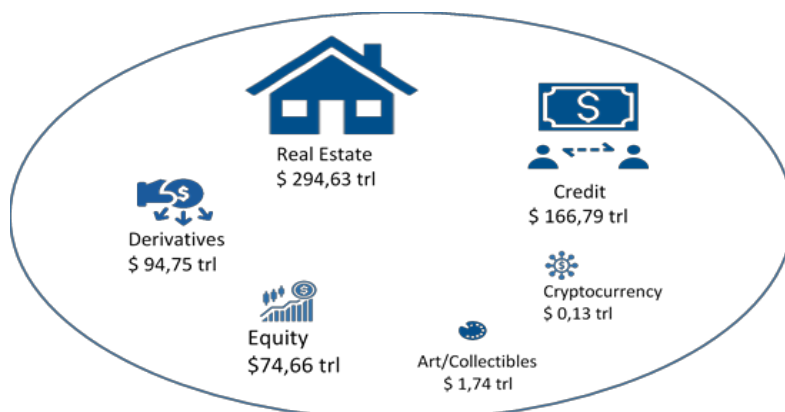


Fig. 1 - Global Asset Class Capitalization in 2018. Source: CeTIF

1.2 Securitisation Market and process constraints

Converting these illiquid assets into tradeable securities, which enables a financial institution to efficiently allocate capital and risks and increase liquidity, is an essential task especially during uncertain economic scenarios. To achieve this goal, the prevalent mechanism applied throughout the recovery period after the financial crisis was Securitisation.

Securitisation operated as an effective deleveraging instrument in the European banking sector, which held a significant amount of non-performing loans in the balance sheets, freeing capital for further lending. However, as shown in the chart below (AFME, 2020), after the peak of European issuances recorded in 2008 with Eur 818,7 billion, the following years brought a significant drop for Securitisation emissions.

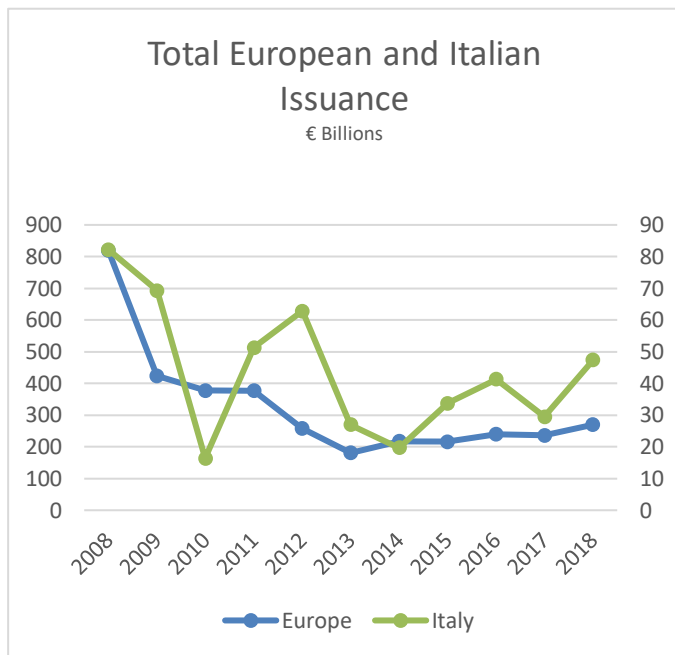


Fig. 3 - Total European Issuance. Source: AFME Securitisation Data Report

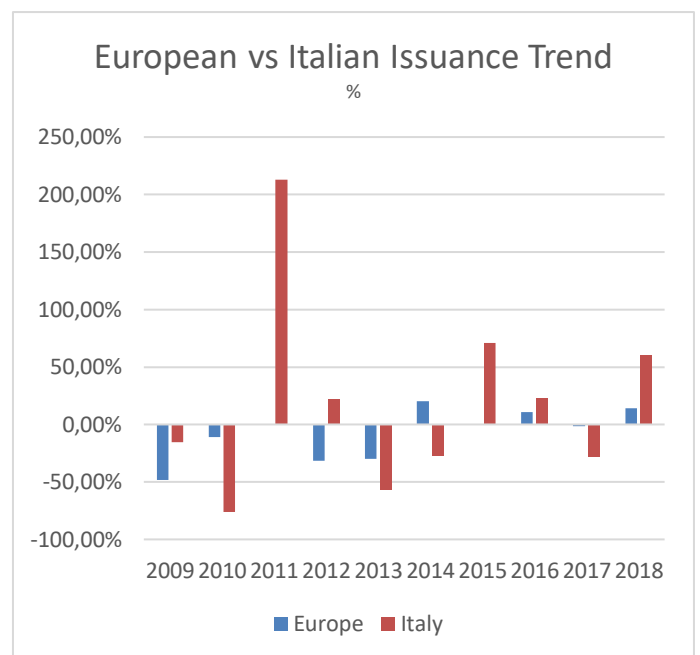


Fig. 2 - European vs Italian Issuance Trend. Source: AFME Securitisation Data Report

The main causes of decrease in issuances lie in the presence of information asymmetries, high entry costs, lack of transparency and complexity.

Information asymmetries is meaning that buyers are uncertain about credit quality as described by sellers which creates a gap between judgments on the potential value of a portfolio.

High due diligence costs are necessary to acquire sufficient information and fill the aforementioned information asymmetry, with a consequent barrier to entry for smaller operators. The securitisation market, specifically of European NPLs, historically has been a limited playing field with few buyers able to obtain significant bargaining power with sellers and are often induced to sell NPL portfolios to comply with limits imposed by the supervisory authorities or to guarantee the expected level of performance consequently impacting sale prices.

Last but not least, in general transparency and complexity are related to the fact that securitisations are often too complex especially for retail investors, whose ability to assess the underlying risk could be weak. The shortage of transparency perceived by the market intensifies the lack of trust which is one of the reasons why there are difficulties to revive investors' appetite for securitisation products, even though the European default rates were low during the Financial Crisis.

The decline can also be attributed to the process itself as these transactions involve many participants with differing roles, objectives and requirements, who face contrasting issues around the storage and the transfer of the information flow. Therefore, securitisation operations currently result as a lengthy and costly process.

In order to overcome these remarkable limits, it is essential to introduce both regulatory amendment and technology enhancement:

1.3 Regulatory amendment – STS Framework

European post crisis regulation 2017/2401 - 2017/2402 (EU, European parliament and council, EU Regulation 2017/2401 - 2017/2402, 2017) attempted to revert the trend and sort out some of the constraints described above with a new securitisation framework aimed at strengthening investor's confidence by supporting Simple, Transparent and Standardised securitisations (STS), in contrast to more opaque and complex securitisation transactions, confirming the importance of these financial instruments as an effective funding channel to the economy. The STS framework, came into effect on January 1, 2019, established a preferential capital treatment for those securitisations that comply with a new set of regulatory criteria that should guarantee an easier credit analysis and investor's comprehension with the increase of information disclosure between the parties.

We must point out that, despite regulator efforts, STS framework has not yet produced a huge effect on the market with significant in progress still needed regarding the treatment of synthetic securitisations. In 2019, only Eur 67.6 billion in STS securitisations were issued, which represented 31% of total issuance in the same year, and the cumulative issuances in the first half of 2020 amounted to Eur 79,3 billion of which Eur 18,4 billion were notified as STS, corresponding to 23,2% of the total volume. As of Q2 2020, a total of 330 STS securitisations were notified to ESMA, which are mainly focused on Trade Receivables, Auto Loans/Leases and Residential mortgages transactions, as described by the graph below (ESMA, 2020).

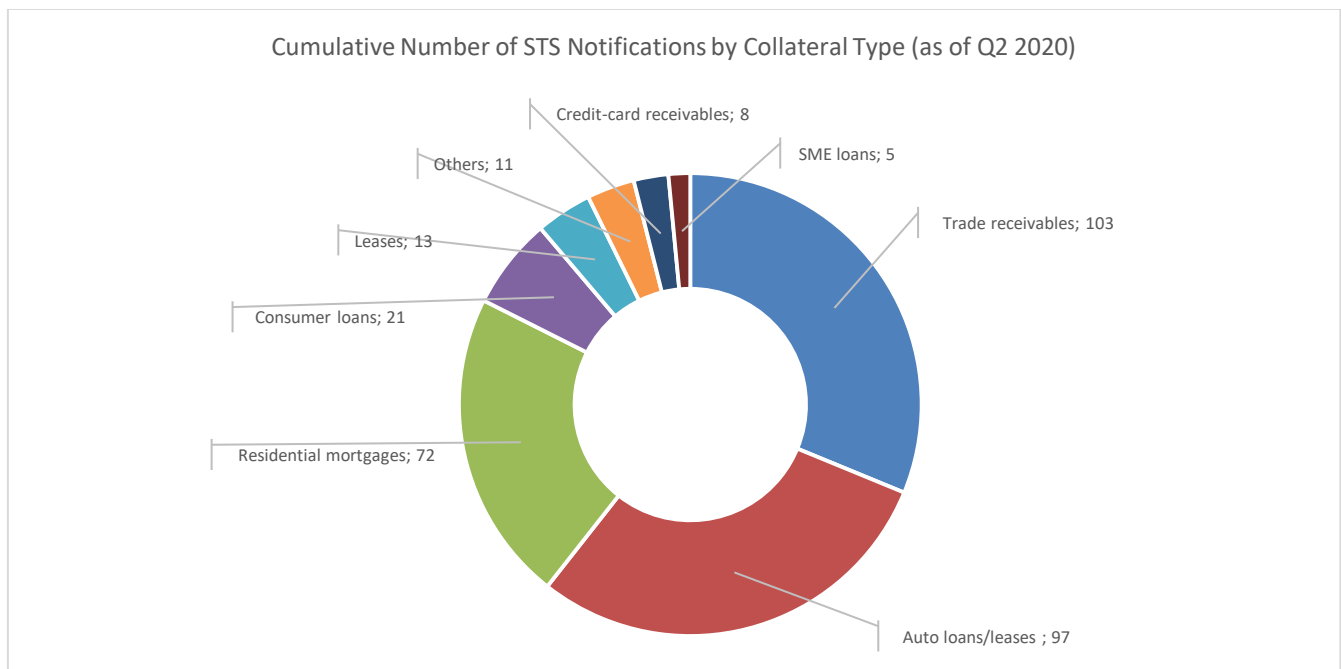


Fig. 4 - STS Notifications by Collateral Type. Source: ESMA

1.4 Technology Enhancement

Beside regulatory action, in this context, financial technology represents the keystone to boosting the securitisation market and streamlining asset marketability. The evolution of blockchain, especially, could positively impact the market (TAPSCOTT A., TAPSCOTT D, 2017). bringing numerous advantages including lower costs and faster transactions. As we will see in the next paragraphs, blockchain incorporates a single source of data for all the participants, which can compensate for the existing lack of information connection and standardization within the network from loan origination to primary issuance and through the entire life cycle of the securitisation. This technology, through sharing and synchronization of digital databases, could ultimately materialize time and cost savings, such as increased data availability, greater transparency, elimination of transactional parts and automation. Direct access to information could also facilitate and potentially reduce reporting requirements for both investors and regulators.

2. Applying blockchain to securitisation

2.1 Securitisation Process

In order to understand how the blockchain technology can improve the securitisation market, it's necessary to focus on the entire process and identifying the activities that can benefit from blockchain (DELOITTE, 2017); (HOFMANN, STREWE, BOSIA, 2018).

Here a brief diagram which synthesizes the main phase of a securitisation process.



Fig. 5 – Securitization process

Let's have a look in detail.

2.1.1 Credit origination

Despite the heavy investments that banks have made in recent years to digitize the underwriting process, many steps are still managed manually and offline.

There are many inefficiencies affecting the credit processes:

- information, where digital, resides on different legacies, they do not have a common storage standard.
- paper information, beyond higher storage costs than digital information, is often useless as it is only physically accessible and its use together with digital data is often complicated and expensive.

The first step, even if not essential, to reap the greatest benefits from the blockchain is to originate credits digitally. Today, technology already supports this process through the use of smart contracts and tokens. These digital entities describe all the information generated during the underwriting phase such as, for example, the details of the ratings (i.e., the individual scores of the rating engine), the details of the collateral linked to the credit, the information on the counterparty, the details of the credit. (i.e., amortization plan, interest rates, ...)

If the credit is not digitally originated, it can still be put in the blockchain, but it will be necessary for the originator to certify the truthfulness of the information, introducing a non-negligible operational risk / fraud risk which can however be mitigated by the use of data quality controls that allow better monitoring of the consistency and correctness of the data.

The information included in the blockchain is made unchangeable and a timestamp is associated with them. This generates several advantages, enabling the players in the blockchain to have complete visibility of information with maximum detail, making the information immutable, reducing the risk of data loss / alteration, facilitating due diligence activities as described in the next chapter. Last, any information update is communicated to all participants in the blockchain, thus making the communication process timelier and more transparent.

2.1.2 Structuring the securitisation

This phase is one of the most complex as it involves the participation of numerous actors and a long series of activities to be carried out, the most important of which is, without doubts, the Due Diligence.

This activity includes a series of very detailed analyses on the underlying assets, counterparties, and collaterals aimed at confirming the compliance of the credit pool with the specifications of the operation to be carried out.

The analyses are carried out by various actors such as, the arranger, the bank distributor, and the servicer with different degrees of detail based on the information available on the credits.

These are very long and expensive activities but essential to avoid fraud on non-existing assets, already securitised, or qualitatively different and / or incompatible with the characteristics of the securitisation.

Today these activities are carried out manually by sharing information between the actors on traditional channels (i.e., mail, files, etc.) which implies operational errors, slowness, incompleteness, etc.

In this phase the blockchain allows to optimize various aspects of fundamental importance:

- Coordination between the actors to avoid double effort on the same analysis: everyone can know the checks in progress by other actors, thus limiting the risk of double effort,
- Speed of analysis: information is readily available to all participants and, if the blockchain platform is equipped with a business intelligence module, it can be providing a great value in analysis
- Uniqueness of the information: having a single database, the risk of misalignment of the analysed data is avoided, thus improving the comparability of results.

2.1.3 Contract management

The definition of the contracts governing the securitisation operation is a tricky activity which is characterized by numerous reworking of documents with the consequent need of versioning.

This activity remains manual even on the blockchain but the comparison between the counterparties, thanks to a single environment where contracts can be shared, allows everybody working on the latest version of the documents, relying on a quick tracking of all changes, increasing their visibility and reaching an agreement between the various actors involved.

The improvement of the dialogue between counterparties leads to better transparency within the blockchain actors and the reduction of costly information asymmetries.

2.1.4 Issuing and settlement

The phases of issuing the instrument and settling it on the primary market are phases in which the blockchain does not introduce any significant advantages.

Therefore, these activities remain managed according to current operating practices.

2.1.5 Lifecycle management

Once the placement is completed, the servicer begins the management of the securitisation.

In this phase, ordinary activities are managed such as, for example:

- debtor's payment collection
- investor's payment (the so-called payment waterfall)
- accounting management (i.e., bank transfer) and accounting checks
- regulatory reporting
- crystallization of collaterals
- management, where required, of NPL processes (monitoring, credit recovery, legal actions)
- management of credit revolving (i.e., commercial papers securitisations)

All these activities are carried out through dedicated applications of the servicer and it would be expensive and futile to replicate these functions in the blockchain platform.

Instead, it is more appropriate to build an integration so that the data residing on the servicer's legacy are shared in real time on the blockchain with all the other participants in the securitisation.

Once the participants have agreed on what type of data need to be shared, these could be stored on a common database in the blockchain and all the actors could access it when needed.

Often the cost and time spent to have the information available timely with the desired degree of detail is underestimated: the blockchain allows cost reduction and transparency increase removing the information asymmetries between counterparties.

2.1.6 Monitoring and reporting

As reported above, the information uploaded to the blockchain can be shared and used at a lower cost than current securitisation management models.

In particular, using a shared database allows to normalize information and increase data consistency, manage a single standard for the data, use only one communication channel, ensure a unique and certified data source, reduce, if not eliminate, the need to reconcile data, as they are natively consistent, reduce the time lags of information availability, speeding up all lifecycle management activities and last automate all internal /market reporting.

There can be different degrees of sophistication depending on the objective of monitoring: from simple data extractions, to business intelligence interfaces for advanced analysis carried out by all the participants in the blockchain. It is therefore possible to carry out continuous low-cost due diligence that allows to keep the risks of the operation under control.

For monitoring purposes, it is possible to define KPIs or trigger events: when they have broken, the participants receive an alert that allows them to activate remediation actions. For example, in the securitisation of revolving credits, it is possible to verify that the composition and geographical / sectoral / qualitative concentration limits remain, during the entire life of the transaction, the same as those that had been defined at the beginning. If these limits are violated, all participants would be aware of them and promptly activate the planned remediation actions.

Sharing information also benefits product pricing as all investors are able to carry out real-time assessments of the value of the securities. Indeed, pricing models need accurate data to calculate the correct price: in a top-level integration, pricing engine could be integrated directly to the database of the blockchain, making the pricing operation easier, cheaper and faster. The improvement in pricing can generate narrow spread, for the benefit of the market transaction.

Also, the investors can access specific data of the securitisation: this could be a distinctive characteristic compared to the ordinary securitisation. The investors always want to understand where their money are allocated and the transparency guaranteed by the blockchain allow them to prefer this type of securitisation to the others.

2.2 Blockchain: Benefits & Limits

As discussed in the previous section, a key point of blockchain technology applied in securitisation would be the establishment of ecosystem of peers, enabling a “many-to-many” relationship, reducing the barriers to entry for both transferors and final investors (GATTESCHI, LAMBERTI, DEMARTINI, PRANTEDA, SANTAMARIA, 2018). A blockchain-based platform, especially for the invoice securitisation, could represent a cutting-edge tool for Small Medium Enterprise to obtain credit or funding for their invoices. A significant number of SME that are currently looking for funding cannot access to the securitisation market acting as a transferor for their invoices because of the regulatory limitation, and consequently have to rely on another financing instrument (e.g., advance invoice financing) which are significantly less effective.

A blockchain-based platform has the possibility to enable SME to access to securitisation (IBM, 2019) without the need for guarantees or collateral to report to the Central Credit Register of the banking circuit, because it would allow to certify the successful transfer of individual invoices to a bank or other intermediary, allowing immediate control by the transferee and effectively overcome the phenomenon of multiple transfer of the same invoice. The effectiveness of such “certification service” become more significant the more is the number of the participants.

Also, on the other side of the market, private investors could benefit from such a platform because the efficiency in manage the transactions and the digital assets could allow the fragmentation of the financial asset allowing the distribution of securitisation directly to individual private investors instead to Representative of Noteholders only.

Another benefit of a blockchain-based solution is the efficiency that can bring to the ecosystem (ABADI, BRUNNERMEIER, 2018). The process efficiency is basically generated by three aspects.

The first one is *establishing trust among the actors*: a blockchain-based platform could introduce a new model based on incentives, not only economical but also reputational in order to guarantee the transparency along the chain, potentially leading to disintermediate the intermediaries. Within this ecosystem, it’s again easier for smaller or private investor to access to these products, increasing the audience. It’s obvious that every member has to accept the platform standard in order to guarantee a controlled access to the network.

Secondly, *automation through smart contract*: introducing a blockchain-based solution for securitisation, implies the digitalization of all the asset from which it is composed the securitised product. By implementing what we can define a “digital asset”, a digital representation of the real financial asset, it is possible to manage and historicized all its life cycle, included all the transfer of property. This allows not only to make natively available all the history of the asset, starting from an Invoice or an NPL to the securitised tranche, which can significantly benefit also the reporting process, but also to build on top of that, any kind of business logics. In a blockchain based application, these business rules are encoded in the so-called Smart Contracts, a self-executing code running on the decentralized blockchain network. These advantages are native in a blockchain-based application and doesn’t require for the implementation of other technologies on top.

Last but not least, *data certification through Oracles*: besides the data stored immutably in the distributed ledger, a blockchain-based application is able to invoke certified external data sources, the so-called Oracles, in order to validate and transmit data from external sources to blockchain systems to be elaborated by the Business logic. In a blockchain based solution for securitisation, a possible Oracle could be “Agenzia delle Entrate” (the Italian tax authority) to certify the validity of the electronic invoice as potential underlying of the Securitised asset. This capability allows to significantly reduce due diligence operations, consequently timespan, and intensify the control frequency.

A key theme to be addressed in the realization of a blockchain based solution is related to the identification of the actors that create the ecosystem.

The securitisation process, as highlighted in the previous paragraphs, is complex and involves the participation of a large number of actors with specific tasks in different stages of the process. To define the ideal number of roles that have to be implemented for the solution, it's necessary to take into consideration the trade-off of two aspects: the first one is Operative Complexity, which guides to keep a moderate number of actors involved.

Because more actors are involved, higher would be the number of interactions and the functional paths to be managed by such a platform. Secondly, Data Security, which guides to increase exponentially the number of actors involved, because the higher is the number of participants, the higher is the effectiveness of the certification guaranteed by the actors that operate in the network. It is implied that according to the different steps of the securitisation process to be automated, the actors involved have to participate with a role in the platform.

The second key topic to be addressed is the choice to rely on a permissionless or permissioned blockchain for enterprises. Permissionless blockchains (also called public blockchains) are open to anyone to read, write transactions to, and participate in the consensus process. Permissionless blockchains have several advantages.

First of all, entry costs for new participants are minimal, because the entire infrastructure is already available for all the actors. On the other hand, no central entity controls the proceedings of a public blockchain, the network is spread across all the different nodes and the distribution is concrete.

But it has also the disadvantage that every transaction involves a fee, generally the transaction speed is very low, and moreover it's not possible to customize, based on individual request, the governance structure and the business logic on top.

A permissioned blockchain (also called private blockchain) generally has more applicability for enterprise solution, specifically for financial services, because it includes the ability to keep certain information and transactions private, with different levels of access for different parties, in this way the actors have the possibility to expose some information to some actors and hide other information to other roles. It allows faster transactions and the ability to scale up transactions and data and it gives the possibility to tailor the smart contract on participants' needs.

As a downside, the whole infrastructure has to be set-up with costs proportionate to the ecosystem dimension in order to guarantee the decentralization and immutability of the ledger; at least one node to each actor role has to be set-up.

Third point to be analysed and addressed, in order to implement a solution suitable for participants needs, is platform governance, which implies the management and maintenance of the business logic and the rules that govern the access to the platform.

3. NPL Securitisation

3.1 NPL Context in the European and Italian Market

As already mentioned, from an initial analysis of the European and Italian scenario, securitisation operations are down compared to previous trends. However, the Italian banking system seems to have realised that through this instrument it is possible to significantly improve pricing levels compared to a traditional assignment of credits simply by virtue of a growing response of NPL stocks. The slow recovery of recent times represents an awareness of the importance of the securitisation instrument. Among the factors that can be considered for facilitating this recovery there are the implementation of a complete and timely regulatory framework on how to carry out the operation, the galloping technological and financial innovation, the need for banks to overcome the risk of asset concentration in an increasingly competitive environment, and the internationalisation of financial markets.

This problem has affected the entire Europe, particularly Italy, where the volume of credit deteriorated NPL is the highest in the continent.

The market for non-performing loans has broken down in Europe after the lockdown period. In fact, in the first half of the year total transactions for 30.4 billion euros were concluded, of which 89.8% between Italy (18.2 billion euros) and Greece (9.1 billion). The 30.4 billion are compared with the 41.8 billion euro deal of the first half of 2019 and the record of 105.2 billion in the first six months of 2018 (Bebeez, 2020).



Fig. 6 – European overview - NPLs sales by year. Source: Debtwire NPL Database

Since 2015, Italy has recorded transactions with a gross turnover of over 130 billion Euro which suggests a strong Italian presence in the Non-Performing Loan sector.

3.2 As-Is process of NPL Securitisation

An initial analysis of the phenomenon of NPL securitisations in the Italian and European context highlights the issue of credit quality which has been the subject of discussion in recent years and of numerous regulatory interventions, but still today it is one of the most complex problems to solve.

Among the elements that directly affect the theme of Non-Performing Loans, we have to consider the quality of the securitisation processes and costs of managing volumes of securitised loans.

In this respect, it is necessary to assess the position of banks in order to improve the securitisation process and the credit management capacity.

Changes will be needed in the models and operational processes that securitisation cannot fully guarantee.

Therefore, the main transformation elements of the models and operational processes on which banks will have to intervene are containment of NPL input flows, the increase in recovery performance and the exploitation of the underlying collateral.

Banking institutions are now aware of the importance of achieving, and subsequently maintaining, a high level of quality of data relating to the Non-Performing Loan portfolios to ensure consistency, stability, completeness, accuracy and, in general, reliability of the database on which a plurality of important stakeholders must, now more than ever, rely. In addition to the Management functions of the bank, the main users of the data are: the managers of the recovery process, Credit Risk Management, the Supervisory Bodies, potential buyers and investors, and advisors and rating companies.

In addition, as a financial operation, securitisation can meet multiple goals and produce a wide range of benefits for both stakeholders from a broader and economic point of view.

The originator and the investors derive the greatest benefits for securitisations.

There are several reasons that can make securitisation an attractive form of financing for the originator. In the international experience of securitisation, two main categories of possible benefits for the originator have been identified:

- diversification of collection sources
- rebalancing of the financial structure

Regarding the first point, securitisation gives the possibility to smaller companies, or with low credit standing, to access this form of financing, which is also more efficient when compared to alternative channels.

The reasons for this higher efficiency and lower cost lie in the ability of the issuer, through securitisation, to issue securities that have a higher rating (mainly thanks to the underlying credit enhancement structure) compared to other credit instruments that would only be based on the originator's rating.

The other advantage is, as already mentioned, the rebalancing of the financial structure. In fact, securitisation allows the removal of assets from the company balance sheet and the demobilisation of medium to long-term assets, which may for example, allow the originator to increase liquid assets and rebalance the ratio of current assets to current liabilities.

From the point of view of final investors, the securitisation transaction may offer benefits in terms of adaptability and flexibility to different financial needs, portfolio diversification, risk sharing and tailored investments

3.3 Data Quality

In relation to the issue of transformation of the models and operational processes on which banks will have to intervene, it is necessary to address the issue of *the quality* levels of the information. This evidence also emerges from an analysis of recent securitisation of Non-Performing Loan portfolios, revisions of internal recovery processes, increased use of external servicers, the disclosure requests by the Supervisory Board and the revisions of valuation processes, which are also related to the introduction of IFRS 9. (REPLY AVANTAGE, 2019)

Data Quality, both from a Business and IT point of view, has an important influence on the assessments of the various stakeholders with an overall effect of creating value for the bank.

This is particularly relevant in the estimates of value adjustments for balance sheet purposes, in the determination of the prices applied to the disposal transactions and the associated additional losses from disposal, for the definition of the cost of securitisation transactions, evaluating the impact on Loss Given Default (LGD) as a consequence of the level of effectiveness of recovery processes, estimating the costs of having to take remedial actions such as arrangement of credit sales that require the involvement of external expertise to fill the information gaps represented by lack/incorrect/outdated information.

The factors that, up to now, have impacted the level of the quality of the data and the difficulty and onerousness of the processes of remediation are the result of a negative concatenation of events favoured from complex operating environments.

These include in particular the high number of positions accumulated during years of negative economic cycle (hundreds of thousands at level system); a general inadequacy of the size of the facilities dedicated to the management of non-performing loans compared to the amount of positions generated by the system in the presence of operational inconsistencies, including at the level of servicers, for the management of the power supply of the systems, both at an early stage and in the day-to-day management of updates; the incompleteness of the paper documentation or the information base as a result of numerous aggregation operations, data migration, transfer of locations, territorial reorganisations, etc.; the high number and diversity of information that is often managed by a plurality of management systems; the presence of gaps in the file management and filing systems of the contract documentation, which is not yet fully managed on a digital basis; the processes for updating valuations related to real estate guarantees and their transposition into management systems.

In this sense, the stakeholders involved in the securitisation process are investment-oriented to speed up and improve data quality through, for example, outsourced services, also leveraging the recent guidelines provided by the BCE, which marks a gradual exit from bank perimeters¹.

¹ The European Central Bank (ECB) has decided that the loan-level data reporting requirements of the Euro system collateral framework will converge towards the disclosure requirements and registration process for securitisation repositories specified in the Securitisation Regulation

This analysis shows a general orientation of capital market operators towards technological platforms that allow the use of a computer program (i.e., an application) and the access of several entities to the same interconnection network (intangible), as such infrastructures may facilitate the interaction of multiple purchase or sale interests of financial instruments related to NPL or UTP loans.

Only in recent times, in fact, the integration of technological mechanisms appears able to allow the systematic use of new computer architectures (including the c.d. blockchain technology) to facilitate the meeting of supply and demand and to support access to relevant information campaigns (so-called big data), with the effect of supporting the purchase and sale transactions in the reference a mass of markets.

3.4 Blockchain Benefits for NPL Securitisation

The analysis carried out revealed several areas in the operations of the Securitisation, on which blockchain technology could intervene:

- Due Diligence and data quality
- Implementation of organisational processes
- Network Information Systems
- Network Actors involved in the platform

The activity of Data Quality and Due Diligence, both from an IT point of view (such as Loan Data Tapes) and from a documentary point of view, has an important influence on the assessments of the various stakeholders with an overall effect of creating value for the bank. Preventive due diligence (cd. pre-acquisition due diligence) plays an important role in securing the securitisation of intermediaries.

The factors that could benefit from the use of the blockchain and that until now, have impacted on the level of data quality and on the difficulty and onerousness of the remediation processes are the result of a negative chain of events favoured by complex operating environments generally linked to the presence of operational inconsistencies, the incompleteness of paper documentation or the information base as a result of numerous aggregation operations, data migration, relocations, territorial reorganisations, etc., the high number and diversity of information, the weakness in management systems documentation and archiving practices, and so on.

Most originators, including many small and medium-sized banks, are not structured to carry out this activity themselves.

Therefore, there is an issue with solving some problems related to internal data management processes.

The European and Italian guidelines² also reviewed the issue of NPLs and it turned out that more accurate management is more profitable than a quick sale.

The servicer/outsourcer is still in play for this precious and strategic activity of enrichment and verification of the information as the instruments are effective for an accurate appraisal independently from the fact that the institute decides to make it an internal management or to assign the task to an outsourcer.

It is necessary to enrich and segment the Loan Data Tape (LDT), the database that must contain data relating to debts and debtors. The most relevant information to update positions and related collateral and personal information continues to be cadastral information, verification of the presence of negative acts (complaints and injurious), the state of enforcement and insolvency procedures, and up-to-date estimates of value.

And here servicers, debt recovery companies and commercial information can become protagonists in this activity and propose themselves in a competitive way to the market if they invest in technology to speed up and optimize the activity of Data Remediation.

As the operating systems of banks are based on accounting and not management, independent servicers need to take advantage of this opportunity.

In addition, the operators of the recovery sector can "give the shock" in this strategic area to the banking world-financial: they must propose to institutions to create specialized units composed not only of legal figures but also of recovery professionals as are the Italian companies with License.

The key in the Implementation of organisational processes is TIME.

Regarding the securitisation organisational process, it is important to focus on the implementation of the process of processing practices that is a complex information investigation process that must be constantly developed to avoid anomalies and ensure necessary customisations for the customer.

For information and recovery companies, a success factor is their ability to differentiate these information processes from competitors, always looking for new investigation and evaluation strategies.

Information companies wishing to offer services and be competitive have two critical aspects to focus on. The first one is to fully understand the needs of customers and have the ability to organize and provide timely answers. The second one is to be able to adapt operational processes to new survey needs by optimizing time and resources.

To address and resolve these two challenges, companies must focus not only on skills but above all on software and solutions to support operational activity in view of Network Information Systems and Network Actors involved in the platform. It is the management of information processes that can make a difference.

(Regulation (EU) No 2017/2402). The ECB has taken this decision with a view to promoting efficiency and standardisation in the securitisation market. (Regulation (EU) No 2017/2402)

² The European Central Bank (ECB) has decided that the loan-level data reporting requirements of the Euro system collateral framework will converge towards the disclosure requirements and registration process for securitisation repositories specified in the Securitisation Regulation (Regulation (EU) No 2017/2402). The ECB has taken this decision with a view to promoting efficiency and standardisation in the securitisation market. (Regulation (EU) No 2017/2402)

A process is a set of activities carried out automatically or with manual intervention. The process environment of the blockchain technology allows you to configure the information processes and related steps that can be executed automatically or require operator intervention.

The operation of defining a process of "informative investigation" is carried out and created in a simple way by a user even non-technical that "models" the input files provided by the customer through a system of Dictionary and "configures" the path of investigation to do. Important in this sense is the role of the actors involved in the process of securitisation that could intervene, through the blockchain to regulate the internal processes of management of the life cycle of the securitisation. The blockchain aims to connect the entire ecosystem involved in securitisation operations and to allow the various actors to interact in the different phases in a transparent way ensuring the following benefits of blockchain: more data quality, process safety, traceability of flows, reduced processing times and paper use. The DLT offers real benefits for the stakeholders of the transactions, providing them with a better level of interaction, greater process sharing and trust, as well as a higher degree of financial asset collateral.

Therefore, we can summarize here the benefits that the securitisation process with NPL and UTP underlying would have with the application of the blockchain:

- Increased productivity and efficiency
- Continuous monitoring and better control
- Flexibility and simplification in process design
- Digitalisation and transformation of data into digital format
- The decentralization, for which the images are distributed between more nodes in order to guarantee the computer security of the systems
- The traceability of transfers, whereby each step is traceable in its entirety and its provenance is recorded
- Disintermediation, whereby transactions are managed without intermediaries, or without the intervention of trusted central institutions, such as banks
- Verifiability, for which every element of the register is transparent and visible to all, therefore it is totally searchable and has the possibility to be verified
- Immutability of the register, so that the data entered in the register cannot be modified without the consent of the network, for this reason it is often spoken about net neutrality
- Programmability of transfers, so it is possible to program actions that are activated only when certain conditions are already set.

4. Electronic invoices securitisation

4.1 Securitisation Electronic Invoices in Italian Market

In recent years, there has been an increasing trend in the securitisation of loans with underlying electronic invoices due to the general economic performance and suggestions dictated by the Legislator.

The changes, introduced by the "Destination Italy" decree³ and the "Competitiveness" decree to the law on securitisation of receivables, make the securitisation easier and more efficient than commercial receivables increasing the benefits of a trade receivables disposal transaction under the factoring law. However, today operators have two legal instruments at their disposition in order to obtain liquidity using the credits deriving from their own business. The market of the cession of the commercial invoices lends itself to operations of securitisation and, with the emission of asset backed securities (ABS), they will have similar underlying credits that can also theoretically be undersigned for small sizes.

In the Italian market, the phenomenon of securitisation transactions of trade receivables is increasingly widespread with the acquisition on average of a portfolio of 5 million trade receivables through a securitisation vehicle.

In detail, the securitised trade receivables from Italian small and medium-sized enterprises were traded on suitable platforms and originated entirely from them. This new securitisation model requires SMEs to use the platforms offered to sell part of their trade receivables from customers while the investor can then enter into a credit insurance contract with a specialized company. Loan securitisation, which is based on commercial invoices characterized by low risk of default and high turnover, is a process that aims to provide liquidity by transforming illiquid assets into securities, effectively monetizing the asset and creating a new source of financing.

The securitisation of trade receivables sold to third parties through bonds is confirmed as significant, around 8.5 billion euro. And despite limited volumes, innovative solutions are expanding: + 15% for the use of the credit card as a tool to optimize the working capital which is worth 3 billion euros, + 225% for invoice trading (the transfer of invoices through digital) amounting to 0.13 billion, while Confirming's first initiatives, the transfer of a supplier payment mandate to a factor that becomes the manager of trade debts, reached 0.5 and 0.01 billion respectively. The possibility of securitisation of a commercial invoice obviously assumes that the more value the greater the payment times that customers allow themselves.

4.2 Limits of the process

In the context of the securitisation process having invoices as underlying, different limits are identified:

1. Non-standard checking of invoices
2. Timetable Transactions for resolving securitisations

³ D.L. December 23, 2013, n. 145, converted with modifications from the Law 21 February 2014 (ITALIAN GOVERNMENT, D.L. 145/2013 "Destination Italy", 2013) which introduced, inter alia, the possibility for the securitisation company to subscribe to bonds or other financial instruments not representing share capital, simplified the formalities required for the enforceability of the assignment of the receivables subject to securitisation, (ii) the D.L. 24 June 2014, n. 91 (ITALIAN GOVERNMENT, D.L. 91/2014 "Competitiveness Decree", 2014) which introduced in our legal system, with some temperaments, the faculty for the securitisation company to grant loans directly to companies (c.d. direct lending), and (iii) last, the D.L. 24 April 2017, n. 50, converted with amendments by Law 21 June 2017, n. 96, on the securitisation of non-performing loans and the participation of the securitisation company in the risk capital or debt of companies in crisis

3. Disposals of multiple credits.

The first element that emerges from the analysis of the invoice securitisation process, and from its related limits, is a slowdown in the issuing activity (up to 5 days after the transmission) with negative consequences for the sales of invoices processed at the end of the period where the relative receipt is not yet available. The wait from when a company sends the invoice to the feedback obtained can have an impact in the individual phases of the sale. Furthermore, the banking system requires firms to work with the entire turnover and with invoices of certain minimum sizes and the resolution status of securitisation transactions has a long duration. The analysis of these points highlights that necessary solutions should be found to maintain compliance, as at present, with the needs of both the originators and the transferees who may carry out financing activities, management and warranty only if the regulatory and operational prerequisites have been fulfilled.

In particular, we refer to:

- the notification information of the credit assignment
- lack of securing the securitised credits (the indications of invoice payments are already present in the xml format, while the indication of the assignment is not currently envisaged in some cases of assignment of credits which will be implemented in the European standard which however will not be unique)
- the timing of issuing the invoices
- the necessary and mandatory control by the originator to verify the validity of the invoices issued by the transferors at the time of the transfer
- management of securitised credit processes
- lack of a standardization process for securitised invoices
- internal deliberation processes that involve several functions, thus slowing down the time of the deliberation itself

According to the rules of electronic invoicing, it is necessary to provide not only invoices in electronic format, but also to implement the related management process. The latest European directives and the interests of the market highlight the need for a standardized and more controlled process of these types of transactions⁴. However, this process would be onerous and complex for customers who will certainly delay the transfer times with consequences in the receipt of both the loans and the guarantees on the successful outcome of the payment (where provided).

Regarding the limit of the current system of securitisations, the use of this tool and asset sales do not allow the transferee to have immediate control of the nature and life cycle of securitised loans and does not hinder the phenomenon of multiple assignments of the same. Looking ahead in the securitisation market, the possibility of exploiting the full potential of electronic invoices was favourably assessed by implementing a non-competitive platform aimed at reducing the risk of multiple assignments, possibly also using innovative technologies (i.e., DLT). A similar "computer register" would allow to certify, by means of non-manipulable computer processes, the successful transfer of individual invoices to a bank / intermediary, allowing immediate control by the transferee and effectively hindering the phenomenon of multiple transfer of the same. The effectiveness of such a service is greater the greater the extent of the participants: therefore, a non-competitive system initiative would be ideal, which would allow interfacing any front-end platforms of the individual transferees. The combination of the use of electronic invoices, digitally signed and whose issuance and fiscal validity is certified by the blockchain, and a non-competitive computer register of credit transfers at system level can effectively contribute to containing and minimizing the risks of fraud for false invoicing and / or multiple assignments.

4.3 Blockchain Benefits for Electronic Invoices Securitisation

The securitisation process would be benefited by informed and partly automated decisions, making it possible to mitigate various forms of risk (double financing and fraud, operational risk and credit risk). This process could be benefited from standardized processes and new technologies that would speed up the times of cession with a cost reduction of emission, sending and archiving of the invoices. Therefore, it should be possible for the originator or the assignee to benefit from a technology enabling the management of securitised credits to be implemented throughout its life cycle. The following table shows the main risks arising from the traditional securitisation operation and the benefits expected from the application of the blockchain.

RISKS	BENEFITS			
	Flexibility	Transparency and Traceability System	Increase Network	Standardization
Double financing	✓			
Operational risk			✓	✓
Credit risk			✓	
Fraud		✓		
Seller analysis				✓
Performance conditionality	✓	✓		

Fig. 7 – Traditional securitisation risks offset by blockchain adoption. Source: Reply internal elaboration

⁴ Directive 2014/55/EU (EU, Directive 2014/55, 2014) with Legislative Decree 148 of 27 December 2018 (ITALIAN GOVERNMENT, DL 148/2018, 2018), which entered into force on 1 February 2019 (articles 6-11) Subsequently, with Measure No. 99370 of 18 April 2019 of the Revenue Agency, the technical rules were defined, so-called Core Invoice Usage Specification (CIUS)

Through the blockchain technology, therefore, a digital platform developed internally or in partnership with a provider of technological services would be offered. The digital mode, together with advanced analytics algorithms, greatly enhances the economies of scale in the onboarding, resolution and servicing of the position. The scheme can envisage the possible involvement of other subjects, depending on the management strategy of the commercial credit purchased, for example credit insurers and / or institutional investors through the securitisation of the credits acquired through the platform (often securitisation is the main strategy, especially when the solution is offered to small businesses).

In this case, the platform enables a relationship between the different actors (several transferors - one transferee), representing a transformation of the traditional securitisation.

The digital platform can free itself from financial intermediaries and offer its own credit advance solution through a system for uploading and buying and selling invoices to be sold, also through the auction mechanism.

This scheme, which creates an originator - transferee relationship (**many** assignors - many assignees), profoundly innovates the relationship between the actors involved in the assignment of credit. Originators can sell their credits at the best conditions offered by a plurality of potential investors. Investors (who are not necessarily financial intermediaries) can access a large number of invoices representing trade credit portfolios, leveraging the risk assessment carried out by the platform according to sometimes shared criteria and in some cases supported by the guarantee of a company credit insurance. Debtors typically receive notification of the assignment but are frequently not the subject of activities aimed at collecting the credit.

At the end of what is analysed here, the role assumed by blockchain technology in the management of the commercial credit assigned is to strengthen the concept of ownership of the credit and, as such, the beneficiary of subsequent payments by the debtor. On this point, it is right to add that, for some types of contracts, it is envisaged by law that the expiration date and therefore, of collectability of the credit, will be calculated starting from the date of receipt of the invoice by the debtor.

5. Conclusion

The benefits provided by the application of the new technology are not limited to the purely, yet fundamental, operational component in managing securitisation and digitalised assets. We have seen how, the strong reduction in what we can generally call “operational risks and costs” of the underlying assets to be managed is sided by an equally relevant reduction in other risks, such as liquidity risk and credit risk.

All this can be directly or indirectly translated into a competitive advantage for the securitisation financial return, that of course can be exploited throughout the entire value chain, specifically for the early birds, that are going to get the wider risk premium spread, as we will see later on.

Looking for example to the main sources of illiquidity previously listed, the blockchain-built securitisation is easily getting rid or significantly reducing transaction costs and discrepancies in evaluation. It can also support a more effective market evaluation and improve the symmetry of information, where a deeper level of information can bring a wiser analysis of the credit situation and score.

We can then propose to group the several components affecting the risk (and consequently the return) of the digitalised asset into two main categories:

- A. The “*Endemic*” component, here including those risk factors that are unaffected or only partially reduced by the introduction of the blockchain technology (i.e., divergence in expectations).
- B. The “*External*” component, representing the risks that can be reduced or offset by the distinguishing traits brought in by the new framework.

Here is a qualitative representation of the effects that the two risk categories can have on the return of an asset assuming a traditional technology adoption curve.

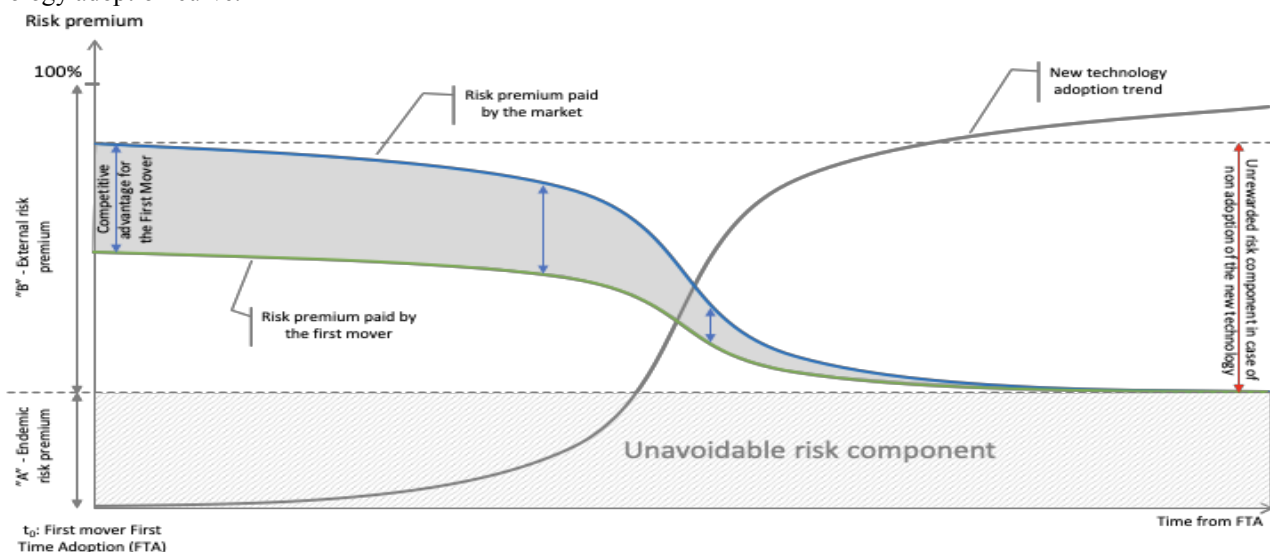


Fig. 8 – Risk vs. model adoption curve. Source: Reply internal elaboration

The main outcomes of the analysis lead to the following conclusions:

- We assume that the new technology has a standard adoption trend (grey line), slower at the beginning and asymptotically reaching a nearly full coverage. (Of course, there will always be exceptions due to late adopters, peculiar product situations, etc.).
- The risk premium (blue line) paid by the market is going to decrease with the blockchain wider adoption, due to the reduced risk associated to the product, i.e., the reduction of the External risk component (B). The total risk curve is going to finally reach its lowest when meeting the limit of the Endemic component, i.e., the unavoidable risk.
- The early adopters will benefit from a competitive advantage (the grey area) representing the difference between the risk generally associated by the market to the specific product (again, the blue line) and the risk effectively borne by the issuer/holder of the digitalised asset. This component is going to be progressively reduced with the wider adoption of the new technology. The costs associated with the hurdle related to the early adoption process are more than offset by the difference in return.
- For those players who will not join the new technology, the bottom line is an unrewarded risk component (red arrow) given that they are bearing a risk not considered by the market anymore.

The bottom line is that the adoption of the new technology can deeply affect the overall business approach and the risk management of the illiquid assets, reducing their external risk component and finally the related return.

An innovative technology is at the same time a leading contestant in the change to financial markets through the creation of new products, new economic sectors and increasing market accessibility. Digitization and blockchain platforms could transform the whole securitisation market boosting efficiency by establishing trust among actors as well as automation through smart contract and data certification. Securitisation operated as an effective deleveraging instrument in the banking sector, confirming the importance of these financial instruments as an effective funding channel to the economy; however, despite the amount of illiquid assets, European current emissions remain stagnant.

New securitisation regulation 2017/2401 - 2017/2042, which came into effect on January 1, 2019, attempted to strengthen investor's confidence by supporting Simple, Transparent and Standardized securitisations (STS), in contrast to previous opaquer and more complex securitisation transactions. In addition to recent regulatory action, we are witnessing the rise of fintech start-ups and technological firms which are establishing solutions to ensure player awareness on blockchain-based securitisation benefits. As we reported, the benefits provided by the application of new technologies are not limited to the purely, yet fundamental, operational component in managing securitisation and more in general digitalized assets. The strong reduction in what we can generally call "operational risks and costs" of the underlying assets to be managed is joined by an equally relevant reduction in other risks, like liquidity risk and credit risk to mention the more important ones. This is particularly true for first movers in new technologies adoption because they could have a significant competitive advantage in connection to the risk premium paid for their issuances. When specifically looking at the credit sector, the distinctive features of this type of deal compared to the traditional offer are listed in the chart below.

FEATURES	DESCRIPTION
FLEXIBILITY	Credit flexibility for any type of SME without the need for guarantees or collateral thout reporting to the Central Credit Register of the banking circuit; ease of use of the vice.
	Speed of placement of a credit (in fact, once the offer is accepted by the platform, the rchase is generally settled within 48 hours).
TRACEABILITY SYSTEM AND TRASPARENCY	Cost transparency in a market with multiple investors competing on the value of the vestment.
	Increase in the efficiency of administrative processes, thanks to the automation of the ases of generation, sending, receiving the credit.
	Increased security, thanks to electronic signature processes that allow the sender and ipient to guarantee the integrity and authenticity of the credit. Automation of validation d verification processes by integrating the document data with the company's nagement systems.
	Immediate control of credits to hinder the phenomenon of multiple transfers.
SAVING COST AND TIME	Significant reduction in the costs of issuing, sending and archiving credits with portant savings compared to traditional issuing processes.
	Reduction of collection times thanks to the increase in the efficiency of the credit issue d receipt processes and the elimination of credit generation and accounting errors.
	Sale of thousands of small credits, thanks to the power of technology. In this way it is ssible to manage seasonal peaks of activity.
	Optimization of securitisation resolution operations. Resolve in a couple of days.
	Time compression in the credit issue and transmission phase thanks to digitalization / ckchain.
INCREASE NETWORK	Management also of single foreign customers.
STANDARDIZATION	Standardization of the securitisation process, which aims to provide liquidity by nsforming illiquid assets into securities, effectively monetising the asset and creating a w source of financing.

Fig. 9 – Blockchain main advantages in the credit issuing process. Source: Reply internal elaboration

The paper has explained how the introduction of blockchain could reshape securitisation process and participants with concrete benefits along all the value chain, especially for credit origination, structuring phase, lifecycle management, monitoring and reporting with reduction in terms of costs and time, increase in transparency and data quality. It was pointed out that blockchain, in

preparation for an increase in non-performing loans (NPLs) at this historical moment of the economy, could cope with this new wave of management of NPLs so as to bring the technological benefits of blockchain to the world of investors and financial services. Finally, with the increase in securitisation of invoices and with a greater awareness of the legislator, the use of blockchain technology has developed through platforms that then offer initiatives specifically targeted to the segment of small enterprises, to which more flexible services are provided, such as: a shorter period of time between the preparation of invoices and the provision of liquidity; the choice of invoices to be credited; the confidentiality of debtors.

All this leads the way to a deeper analysis of the blockchain-based securitisation process, with the target to apply the new technology to a wider perimeter of products. The objective is aiming to design and to bring to economic and financial community an "ecosystemic" tool through innovative approaches that can clearly and easily present the widespread returns available for all involved players.

Paolo Fabris, Valerio Begozzi, Angelo Santarossa, Francesco Dammacco, Gianmarco Fagiani, Riccardo Rostagno, Chiara Frigerio

References

- Abadi, Joseph, and Markus Brunnermeier. *Blockchain economics*. No. w25407. National Bureau of Economic Research, 2018.
- Afime (2020). AFME Securitisation data report Q2 2020.
- Akerlof, George A. "The market for "lemons": Quality uncertainty and the market mechanism." *Uncertainty in economics*. Academic Press, 1978. 235-251.
- Bebeez (2020). Npl Report on 7 Months 2020 del 3 agosto 2020.
- Caselli, Stefano, and Giampaolo Gabbi. *Il credito e la crescita: Banche e finanza per le imprese*. EGEA spa, 2020.
- CeTIF (2020). Elaboration from International Monetary Fund, (2020). Private debt, loans and debt securities. Bank of International Settlements (BIS) reported in SIFTMA, (2019). Capital Market Fact Book. Deloitte, (2019). Art & Finance.
- Cominelli, Valentino. "PropTech 3.0. blockchain and smart contracts disruption for the real estate industry: development of an innovative business model for tokenization in the NPL market." (2020).
- Confalone, Paolo Roberto. "Analisi sulla supply chain aziendale e sull'utilizzo della tecnologia blockchain." (2020).
- Davidson, Sinclair, Primavera De Filippi, and Jason Potts. "Economics of blockchain." *Available at SSRN 2744751* (2016).
- Deloitte (2017). *Applying blockchain in securitisation: opportunities for reinvention*
- Esma (2020). *List of Securitisations notified to ESMA as meeting the requirements of Articles 19 to 22 or Articles 23 to 26 of Regulation (EU) 2017/2402*.
- EU (2014). Directive 2014/55.
- EU (2017). European parliament and council, *EU Regulation 2017/2401 - 2017/2402*.
- European Parliamentary Research Service (2020). *Blockchain for supply chains and international trade*
- Gatteschi, Valentina, et al. "To blockchain or not to blockchain: That is the question." *IT Professional* 20.2 (2018): 62-74.
- Gervasoni Goware & Guerini Next, (2020). *Come la tecnologia cambierà il rapporto banca-imprese*
- Hofmann, Erik, Urs Magnus Strewe, and Nicola Bosia. *Supply chain finance and blockchain technology: the case of reverse securitisation*. Springer, 2017.
- Hyperledger Fabric (2020). *Smart Contract and Chain Code*
- Ibm (2019). *Blockchain can help increase access to credit for SMEs*
- Italian Government, I. (2013). D.L. 145/2013 "Destination Italy".
- Italian Government, I. (2014). D.L. 91/2014 "Competitiveness Decree".
- Italian Government, I. (2018). DL 148/2018.
- Moody's (2019). *Blockchain improves operational efficiency for securitisations, amid new risks*
- Poonam Garg, Technological Forecasting and Social Change, 120407 (2020). *Measuring the perceived benefits of implementing blockchain technology in the banking sector*
- Reply Advantage. (2019). *Analysis on European Commission institutional paper "European Economic Forecast - Autumn 2019". Displayed data and Forecasts for the EU refer to the EU28, including UK*.
- Tafolong, Tedongap (2017). *Illiquidity and Investment Decisions: A Survey*. Working Paper: Cross Asset Investment Strategy.
- Tapscott, Alex, and Don Tapscott. "How blockchain is changing finance." *Harvard Business Review* 1.9 (2017): 2-5.
- Treleaven, Philip, Richard Gendal Brown, and Danny Yang. "Blockchain technology in finance." *Computer* 50.9 (2017): 14-17.
- Wüst, Karl, and Arthur Gervais. "Do you need a blockchain?." *2018 Crypto Valley Conference on Blockchain Technology (CVCBT)*. IEEE, 2018.
- Xinying, US Patent App. 16/888,421 (2020). *Blockchain-based financing*
- Zheng, Zibin, et al. "Blockchain challenges and opportunities: A survey." *International Journal of Web and Grid Services* 14.4 (2018): 352-375.

Risk Management Magazine

Anno 15 n° 3 Settembre – Dicembre 2020

Direttore Responsabile (Chief Managing Editor)

Maurizio Vallino

Condirettore (Deputy Managing Editor)

Corrado Meglio

Editorial Board

Giampaolo Gabbi - Chief Editor Business Economics Area (SDA Bocconi); Paolo Giudici - Chief Editor Statistical Economics Area (Università di Pavia); Daniel Ahelegbey (Università di Pavia); Raffaella Calabrese (University of Edimburgh); Robert Eccles (Oxford University); Franco Fiordelisi (University of Essex); Pier Giuseppe Giribone (Università di Genova); Gulia Iori (London City University); Richard M. Levich (New York University); Michèle F. Sutter Rüdissler (University of San Gallen); Peter Schwendner (ZHAW Zurich University of Applied Sciences); Alessandra Tanda (Università di Pavia).

Scientific Committee

Arianna Agosto (Università di Pavia); Ruggero Bertelli (Università di Siena); Paola Bongini (Università Milano Bicocca); Anna Bottasso (Università di Genova); Marina Brogi (Università La Sapienza di Roma); Ottavio Caligaris (Università di Genova); Rosita Coccozza (Università di Napoli); Costanza Consolandi (Università di Siena); Simona Cosma (Università del Salento); Paola Ferretti (Università di Pisa); Andrea Giacomelli (Università di Venezia); Adele Grassi (Vice Presidente APB); Valentina Lagasio (Università La Sapienza di Roma); Duccio Martelli (Università di Perugia); Laura Nieri (Università di Genova); Pasqualina Porretta (Università La Sapienza di Roma); Anna Grazia Quaranta (Università di Macerata); Enzo Scannella (Università di Palermo); Cristiana Schena (Università dell'Insubria); Giuseppe Torluccio (Università di Bologna).

Vignettista: Silvano Gaggero

Proprietà, Redazione e Segreteria:

Associazione Italiana Financial Industry Risk Managers (AIFIRM), Via Sile 18, 20139 Milano

Registrazione del Tribunale di Milano n° 629 del 10/9/2004

ISSN Print 2612-3665 – **ISSN Online** 2724-2153

DOI 10.47473/2016rrm

E-mail: risk.management.magazine@aifirm.it; Tel. +39 389 6946315

Stampa

Algraphy S.n.c. - Passo Ponte Carrega 62-62r 16141 Genova

Le opinioni espresse negli articoli impegnano unicamente la responsabilità dei rispettivi autori

SPEDIZIONE IN ABBONAMENTO POSTALE AI SOCI AIFIRM RESIDENTI IN ITALIA, IN REGOLA CON L'ISCRIZIONE