Articles

From the Black swan, to the Snowball. Risks of Covid-19 pandemic for consumer credit scores in the lack of a harmonized regulatory intervention

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Abstract

In light of the harmful and wide-ranging effect of the coronavirus pandemic, many governments in the European territory and on the global framework rushed to introduce forms of financial support for those groups that are susceptible to be economically affected by the current situation in order to limit the economic fallout of the pandemic. Still, and in spite of the significant level of

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regulatory intervention, no major normative change addressed the area of consumer spending and consumer credit. Considering the expected length of the phenomenon, and its impact on the economy and employment, the management of consumers' economic exposure and of unpaid debt is though meant to emerge as a major consequence during and after the expiration of the pandemic: in particular, significant risks are related to the consequences that the deterioration of consumers' exposure caused by the COVID-19 and the pandemic-related factors is likely to have on their credit scores (and, subsequently, in terms of outcome of future creditworthiness assessments). Scores have a major impact on consumer credit landscape, and badly determined/distorted scores invest both consumers and credit operators: consumers are precluded from accessing credit in a moment of financial distress; banks and other institutions are not able to properly discriminate between the quality of potential borrowers, therefore facing risks of overexposure to losses and unprofitable operativity. In order to prevent a further worsening of the (already distressed) global economic health, it is therefore pivotal to promptly introduce harmonized corrective measures to mitigate the risk of unsought deviation in the credit scoring sector. The research investigates the impact of the events related to the COVID-19 infection on the scoring software's functioning, considering how the pandemic is likely to impact on both macro and microeconomic factors related to consumer behavior and indebtedness. The analysis is then developed in order to provide a set of recommendations for interventions with the aim to preserve algorithms' stability, accuracy and predictive power over the pandemic and during its aftermath.

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1. The absence of intervention in the regulation of credit scoring systems against the effects of Covid-19 pandemic

In light of the harmful and wide-ranging effect of the coronavirus pandemic, many governments in the European territory and on the global framework rushed to introduce forms of financial support for those groups that are susceptible to be economically affected by

the current situation in order to limit the economic fallout of the pandemic.[1] Amongst the various aspects, that have been addressed by regulatory interventions, a common trait is observed in the introduction of measures to financially support families, SMEs, and temporally unemployed workers.

Particular attention has been devoted at reducing some specific expenses as well: as long as consumers' position is concerned, many laws enacted worldwide in response to the coronavirus introduced mortgage relief options and deferred payment plans for those houseowners, who were financially impacted by the coronavirus pandemic.[2]

In spite of the significant level of regulatory intervention, no major normative change addressed the area of consumer spending and consumer credit yet. Even if such occurrence is handily explained - as it has been defended by governmental institutions within and outside Europeans' borders[3] - by the leading interest in prioritizing other definite forms of expenditure (namely, those related to immovable residential properties, or connected to small and medium enterprises' operativity), it goes without a doubt that the pandemic has radically altered traditional modes of consumption in indirect (i.e., affecting some of the factors that determine consumer spend—such as consumer confidence, unemployment levels, or the cost of living) and direct forms.[4] Covid-19 radically reshaping consumers' behavior with regards to future spending and – significantly – repayment of previously stipulated loans.

Considering the expected length of the phenomenon, and its impact on the economy and employment, the management of consumers' economic exposure and of unpaid debt is therefore meant to emerge as a major consequence during and after the expiration of the pandemic.

This is further exacerbated when the fact, that access to consumer credit has significantly risen as a major resource of support for small expenditures in the last years, is taken into account: considering both instalment and revolving credit, the European consumer credit market has experienced consistent year-on-year growth since 2013, following the Global

[1] For an overview of the main initiatives, cfr. Blavatnik School of Government, University of Oxford, *Coronavirus Government Response Tracker* https://www.bsg.ox.ac.uk/research/research-projects/coronavirus-government-response-tracker.

[2] E.g. the Italian Government, with Art. 54 of the d.lgs. March 17, 2020, n. 28, postponed up to 18 months mortgage rate payments for individuals impacted by Covid-19. For an overview of different actions brought in at national level, a significant number of research projects are currently monitoring economic impact as well as responses of governments around the world: see International Institute for Democracy and Electoral Assistance (IDEA), *Government responses to Covid-19*, http://constitutionnet.org/; United Nations Conference for Trade And Development, *Coronavirus (COVID-19): News, Analysis and Resources*, https://unctad.org/en/Pages/coronavirus.aspx; European Council, *Report on the comprehensive economic policy response to the COVID-19 pandemic*, 9 April 2020, www.consilium.europa.eu.

[3] Cfr. C. Roberts, *The next COVID-19 crisis: The coming tidal wave of evictions. The curve that won't flatten*, 1 May 2020, www.sfcurbed.com; Z. Tidman, *Coronavirus: Italy suspends mortgage payments amid lockdown. Entire country is in state of quarantine over virus,* 10 March 2020, www.independent.co.uk; J. Atkin, *S&P: How will mortgage payment suspensions related to COVID-19 affect European RMBS?*, 16 March 2020, www.mortgagefinancegazette.com.

[4] K. Jones, *How COVID-19 Consumer Spending is Impacting Industries*, 22 April 2020, www.visualcapitalist.com.

Financial Crisis and the European recession, arising as an important source of revenue for the retail banking sector.[5]

In 2019, under normal conditions, the default rate for consumer loans has been extremely low (oscillating between 2% and 3% of the cases), and despite all pre Covid-19 projections conceded that delinquencies should have continued their descending trend in 2020,[6] if no intervention is made the situation will soon overturn, causing major detriment to consumers and lending institutions.

In the absence of any uniform mandatory act, consumer credit institutions in Europe rearranged their business strategy autonomously, elaborating solutions to support their clients and implementing payment holidays regime, forbearance, deferral and suspension for debt obligations according to each Member States' indications.[7] In a recent statement, the European Banking Authority acknowledged the relevance of moratoria systems and welcomed them as effective tools to address short-term liquidity difficulties.[8] Still, no uniform strategy has been deployed, and no modification has been made regarding pre-existing rules on credit institutions prudential requirements.[9]

Consumers whose, in the past, benefitted from loans or other forms of unsecured credit are primarily affected by the lack of protection determined by the current regulatory uncertainty: not only debtors are forced to burden the weight of the various restrictive measures related to the lockdown (which prevent them, for example, from resuming their work), but they need to save the necessary resources to face imminent expenses at their disposal; this causes a contextual reduction in their spending power, and an ability to comply with agreements with consumer credit companies they originally entered into.

In addition, adverse effects do not only concern the pandemics' immediate repercussions on consumers' spending and repayment capacity: long-term effects that may derive from the exasperation of their debt position involve their ability to access to credit in the future as well.

In particular, significant risks are related to the consequences that the deterioration of consumers' exposure caused by the Covid-19 and the pandemic-related factors (reduction of working capacity and other adverse economic contingencies) is likely to have on their credit scores, and, subsequently, in terms of outcome of future creditworthiness assess-

[5] V. Deloitte, *The Future of Credit. A European perspective*, Spring 2019, www2.deloitte.com.

[6] M. Komos, *2020 Predictions: Consumer Credit, Balance and Delinquency Rates*, 23 December 2019, www.transunion.com; in some of the most affected EU countries – such as Italy – the default rate was even lower, amounting to 1.7% in 2019: see Assofin-Prometeia, *Nel primo trimestre 2019 crescono ancora i flussi di credito al consumo erogati alle famiglie. In frenata i mutui immobiliari*, 19 June 2019, www.crif.it.

[7] For an overview, see Allen&Overy, *Covid-19 – Coronavirus measures implementing forbearance, deferral and/or suspension for debt obligations*, 30 April 2020, www.allenovery.com.

[8] See EBA, *Guidelines on legislative and non-legislative moratoria on loan repayments applied in the light of the COVID-19 crisis*, EBA/GL/2020/02.

[9] See *Regulation (EU) No 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012.*

ments. Any variation will, in fact, have a major impact on consumer credit landscape in the future.

Consumer scores are widely used tools to describe individuals or groups in order to predict, on the basis of their data, behaviors and outcomes: scores use information about consumer characteristics and attributes by means of statistical models that produce a range of numeric scores, and they proliferate in day-to-day interactions.[10] In particular, credit-scoring systems are used to evaluate individuals' creditworthiness for access to finance. Credit scores are implemented by both institutional operators and emerging P2P lending platform: a positive credit score represents an essential means for access to credit, and therefore as a tool for individual and social development.[11]

Through ICTs, social media analysis, wearable devices and app tracking, quantitative and qualitative data are collected to improve consumers' profiling: explored data (usually acquired by a third party operating as a data broker) range from consumption habits to buying preferences, and more in general scan the social ecosystem of individuals as proxies to evaluate their solvency expectancy.

By creating a virtual image of the applicant's personality, these tools jointly use hard and soft data; they profoundly affect the assessment methodologies, going past the mere historical analysis of consumers' economic resources and transactions.[12]

In the US, proper management of the credit scoring processes during the pandemic has been identified by the main leading score modelers (*Vantagescore*, *FICO*) as a priority in order to preserve the stability of the financial system: the three major Credit Reference Agencies (CRAs), Experian, Equifax and TransUnion put in place a special "emergency payment freeze" to ensure that any payment holiday agreement determined by the Covid-19 effects does not modify their clients' score.[13]

The payment freeze strategy is aimed at reaching a twofold goal: on one side, not to impair consumers by worsening their credit score; on the other side – on a precautionary note – to preserve the quality of existing data, and to prevent scoring algorithms from encapsulating transiently biased data that might distort their performance even after the pandemic.

[10] In the US only, roughly 140 scoring algorithms are implemented for a wide range of services, and the most advanced of them can elaborate up to 8.000 individual variables. Cfr. Lexis Nexis, *Alternative Credit Decision Tools: Auto & Credit Lending. White Paper,* 2013, www.risk.lexisnexis.com.

[11] Q. Hardi, Big Data for the Poor, 5 July 2012, New York Times; A. Mcclanahan, Bad *Credit. The Character of Credit Scoring*, in *Representations*, 2014, vol. 126, iss. 1, 31-57; T. Berg, V. Burg, A. Gombovic, M. Puri, *On the Rise of FinTechs – Credit Scoring using Digital Footprints,* in *FDIC – CFR Working Paper Series*, 2018, 4, 3.

[12] M. Hurley, J. Adebayo, *Credit Scoring in the Era of Big Data*, in 18 *Yale J.L. & Tech.*, 2018, 148, 176; see previously A. Davola, *Technological innovation in creditworthiness assessment*, in *Open Review of Management, Banking and Finance*, 2019.

[13] J. Atkin, *Credit scores will be protected during Covid-19 pandemic*, 31 March 2020, www.mortgagefinancegazette.com.

Except for the application of payment freeze programs, credit bureaus did not disclose any other change to their methodology during the pandemic yet: they consider the scores able to perform properly "even in this exceptional situation".[14] CRAs defended that changing the credit scoring model to improve the scores of those undergoing the financial difficulties of the pandemic would ultimately destabilize the entire credit industry, making it no longer a valid indicator of credit worthiness and leading potential lenders into major uncertainty.[15]

In the meanwhile, European consumer advocacy groups tried pushing a payment freeze proposal at the EU level; against this view, the current upfront position is that suspending the reporting of negative credit information during the pandemic would ultimately hurt consumers, especially considering that the negative effects of the economic situation can be mitigated by means of alternative supporting measures enacted by the Member States governments. As a consequence, the European Banking Authority (EBA) merely called on financial institutions to act in the interests of consumers, observing that, as a general principle, measures to alleviate pressure on consumers should not have negative implications for their credit rating.[16]

Indications that EBA provided for facing the Covid-19 effects, though, does not entail prescriptive any force and, as a consequence, credit bureaus are not required to update or otherwise modify their credit score models.

It shall be noted that, in addition to the specific contingencies that the Covid-19 pandemic is bringing up, that consumer debt across the EU already faces a significant (and still ongoing) expansion since 2008 financial crisis, which originated a growing condition of over-indebtedness[17] for a substantive number of consumers in the Union.[18]

Many factors have been identified as sources of over-indebtedness phenomena in Europe. Amongst them, some drivers are endogenous to consumers' personal conditions and attitudes towards credit: individuals' financial illiteracy and subsequent inability to manage finances correctly,[19] together with psychological biases and mental shortcuts that affect

[14] Cfr. N. Kayser-Bril, *Credit scores algorithms keep operating normally even as everything else doesn't*, 15 April 2020, www.algorithmwatch.org.

[15] MoneyFit, *What Is The Impact Of Covid-19 On Credit Reports And Scores?*, 2020, www.moneyfit.org.

[16] Eba, *Statement on consumer and payment issues in light of COVID19*, 25 March 2020, www.eba.europa.eu.

[17] Whereas the term defines those situations, in which individuals' net resources render them persistently unable to meet essential living expenses and debt repayments as they fall due.

[18] For an early analysis on the topic, see N. Fondeville, E. Őzdemir, T. Ward, *Over-indebtedness. New evidence from the EU-SILC special module*, Research note 4, 2010, www.ec.europa.eu.

[19] A. Lusardi, P. Tufano, *Debt Literacy, Financial Experiences and Overindebtedness*, in NBER Working Papers 14808, 2009; A. Lusardi, O. Mitchell, *The Economic Importance of Financial Literacy: Theory and Evidence*, in *Journal of economic literature*, 2014, vol. 52, iss. 1, 5-44; M. Gentile, N. Linciano, P. Soccorso, *Financial advice seeking, financial knowledge and overconfidence – Evidence from the Italian market*, in *Quaderni di Finanza Consob,* March 2016, vol. 83; N. Linciano, P. Soccorso, D. Di Cagno, L. Panaccione, G. Nicolini, M. Ploner, C. Lucarelli, G. Brighetti, E. Cervellati, E. Rinaldi, R. Viale, Riccardo D. Martelli, B. Alemanni, G. Agrusti, G. Ferri, C. Giannotti, C. Cruciani, U. Rigoni, *Challenges in Ensuring*

consumers' decisions and predictions about borrowing[20] are the most common reasons behind poor credit management.

Yet, leading determinants for the expanding level of indebtedness across EU are exogenous as well: over-indebtedness is due both to macroeconomic factors (the post-crisis global economic downturn, persisting inequality, marginalization and financial exclusion of low-income social groups and geographic areas, differentiated access to essential services such as healthcare and education)[21] and to specific phenomenon pertaining to the credit market (lack of transparency of lenders' terms and conditions, irresponsible lending strategies, and systemic exploitation of consumers' information asymmetry).[22]

It goes without saying, that adverse effects arising from systemic over-indebtedness do not affect consumers only: the persistent exposure of banking institutions to Non-Performing Loans (NPLs) or Unlikely-To-Pay (UTP) obligations hinders their ability to promote an efficient circulation of economic resources on the market.[23]

The urgency to curtail the factors producing over-indebtedness originated a profound rethinking of the regulatory strategies for preventing and resolving unsustainable debt situations.[24] In particular, the need of avoiding undisciplined, ineffective, abusive or non-

Financial Competencies: Essays on How to Measure Financial Knowledge, Target Beneficiaries and Deliver Educational Programmes, in *Consob Working Papers*, 2017, n. 84.

[20] L. Andreloni, D. Vandone, *Risk Of Overindebtedness And Behavioural Factors,* in C. Lucarelli, G. Brighetti (eds.) *Risk Tolerance In Financial Decision Making*, Palgrave Macmillan, 2010; H. Shefrin, *Beyond Green and Fear: Understanding Behavioral Finance and the Psychology of Investing,* Harvard Business School Press, 2000; J.R. Agnew, L.R. Szykman, *Asset Allocation and Information Overload: The Influence of Information Display, Asset Choice, and Investor Experience*, in *The Journal of Behavioral Finance*, 2005, vol. 6, n. 2; S. Viale, B. Mousavi, B. Alemanni, U. Filotto, *The Behavioral Finance Revolution. A New Approach to Financial Policies and Regulations*, Elgar, 2018.

[21] World Bank, *UFA2020 Overview: Universal Financial Access by 2020,* 2019, *www.worldbank.org*; A. Demirgüç-Kunt, L. Klapper D. Singer, S. Ansar, J. Hess*, The Global Findex Database 2017: Measuring Financial Inclusion and the Fin-tech Revolution,* World Bank*,* 2018, *passim*; A. Patwardhan, *Financial Inclusion in the Digital Age*, in *Handbook of Blockchain, Digital Finance, and Inclusion*, Elsevier, 2018, 1, 58.

[22] *Ex multis* I. Ramsay, *From Truth in Lending to Responsible Lending,* in G. Howells, A. Janssen*,* R. Schulze (eds.), *Information Rights and Obligations,* Ashgate, Dartmouth, 2005, 47-65; Y. Kong, M. Tampuri, P., Opoku Boadi, *Digital Financial Inclusion: The Star Strategy Approach to Policy Formulation*, in *International Journal of Management Sciences and Business Research* , 2018, 1, 120-129.

[23] F. Bassan, *Unlikely to pay regulation and management, the new challenges*, in *bancaria.it*, 2018, 3, 63-64; V. Makri, A. Tsagkanos, A. Bellas, *Determinants of non-performing loans: The case of Eurozone,* in *Panoeconomicus*, 2014, 61, 2, 193-206; E. Montanaro, *Non-Performing Loans and the European Union Legal Framework*, in M. Chiti, V. Santoro (eds.), *The Palgrave Handbook of European Banking Union Law*, Palgrave, 2019, 213.

[24] United Nations, Inter-Agency Task Force for Financial Development, *Towards responsible borrowing and lending*, 2016, https://developmentfinance.un.org/towards-responsible-borrowing-and-lending; European Coalition on Responsible Credit, *Principles of Responsible Credits,* 2006, https://www.responsible-credit.net/; United Nations Conference on Trade and Development, *Principles on promoting responsible sovereign lending and borrowing*, 10 January 2012, www.unctad.org. As for Member States' initiatives, a major intervention was operated in Italian's insolvency legislation by means of the enactment of the Law on over-indebtedness in 2012 (orig. *Legge 27 gennaio 2012, n. 3. Disposizioni in materia di usura e di estorsione, nonche' di composizione delle crisi da sovraindebitamento*) and the introduction of the Code of corporate crisis and insolvency (*Codice della crisi d'impresa e dell'insolvenza,* d. lgs. 2019, n. 14), which will enter into force in September 2021. See E. Pellecchia, L. Modica (eds.), *La riforma del sovraindebitamento nel codice della crisi d'impresa e dell'insolvenza*, Pacini, 2020.

cooperative behavior on the part of both creditors, led to the introduction of new bodies of law advocating in favor of responsible lending conducts (and, therefore, promoting a major shift from the previous "responsible borrowing system")[25] and promoting supporting strategies for consumers' and SME's crisis management.

Despite the undoubted relevance of such advancements, the path towards a new paradigm for lending is, though, still developing;[26] in the lack of a specific intervention, the effects of the current pandemic are therefore susceptible to further exasperate the fallacies of the EU credit market, and to lead to a new wave of over-indebtedness across Europe. In order to prevent this occurrence, a prompt investigation of the Covid-19 effects' on credit scoring system is pivotal.

2. Covid-related risks for the credit scoring system

Credit scoring systems exploit different and heterogeneous types of (hard and soft) data related to consumers:[27] in the elaboration of the score, information on clients' payments history, proprietary assets, type of credit used in the past, as well as regarding their presence on different social media platforms, purchase rate for specific products, data obtained by GPS tracking, habitual relationships and encounters, simultaneously concur to increase the creditworthiness assessment's predictive power;[28] this way, previously unknown meta-variables – i.e. sets of decisions that can traced to specific aspects of the applicant's personality and consumption attitude – can be identified, and conditions for access to credit re-determined.[29]

In a concerted effort to grasp the implications of these tools for consumers' protection, legal scholars, data scientists, and economists, devoted significant attention at pointing out potential advantages and risks arising from the massive usage of these algorithms for conducting the creditworthiness assessment: opacity and robustness of algorithms, the complexity of their reverse engineering, potential disparate impact, misuse of biased processing and dataset and implications for the due process principle are just some of the

[25] U. Reifner, *Responsible Credit in European Law*, in *The Italian Law Journal*, 2018, vol. 4, n. 2, 426; J. Minnaar, *Over-Indebtedness: Roles and Responsibilities of All Actors*, 2 March 2011, www.cgap.org.

[26] Cfr. O. Cherednychenko, J.M. Meindertsma, *Irresponsible Lending in the Post-Crisis Era: Is the EU Consumer Credit Directive Fit for Its Purpose?*, in *Journal of Consumer Policy*, 2019, n. 42, 483-519.

[27] S. Cornée, *Soft Information and Default Prediction in Cooperative and Social Banks*, in *Jeod,* 2014, vol. 3, iss. 1, 90; also J. María Liberti, M.A. Petersen, *Information: Hard and Soft*, in *The Review of Corporate Finance Studies*, 2019, vol. 8, iss. 1, 1-41.

[28] *Ex multis,* S. Arya, C. Eckel, C. Wichman, *Anatomy of the credit score*, in *Journal of Economic Behavior & Organization*, 2013, 95, 175-185.

[29] F. Mattassoglio, *Innovazione tecnologica e valutazione del merito creditizio dei consumatori. Verso un Social Credit System?*, Milano, 2018, 39.

aspects that literature underlined as requiring a major regulatory intervention to prevent abuses, unlawful financial exclusion and unfair discrimination of consumers.[30]

In addition, current events related to the pandemic are supplementing previously observed risks with a new, specific contingencies, that were unconsidered by the majority of the analysis: a common ground in credit scoring systems' analysis (and, more in general, in the study of predictive algorithms) lies in the fact that these tools are based on the idea that "*the future is like the* past"; prediction is, as a matter of fact, based on the statistical recurrence of patterns of similar behaviour amongst individuals, or by the same individual over time. This assumption has direct consequences on credit scoring algorithms' design: its main implication is that these technologies are generally unfit to manage s.c. 'black swan' phenomena, that is, events that have no significant precedent in (at least) modern history.[31] The problem with black swan events is straightforward: there are, merely, not enough data concerning previous individuals' reaction to these occurrences to establish an expected pattern of conduct for predictive purposes.

Furthermore, the Covid-19 pandemic is not a provisional event: according to previsions, the cumulated economic effects of the lockdown's immediate and long-term aftermath might have repercussions on the global economy for years.[32]

Due to the joint influence of a) the lack of past data regarding analogous event; and b) the uncertainty surrounding the protractions of the epidemic's effects, the current scenario is likely to profoundly affect scoring algorithm's functioning; this might create a 'snowball effect' investing the credit sector, consumers' and market's stability.

A first, intuitive effect of the pandemic in the absence of a proper regulatory interventions is that, as more individuals miss payments due to economic hardships, their credit score will gradually drop. Even if this could be considered a physiological effect of the economic contraction due to Covid-19, in the lack of a proper re-calibration of scoring algorithms, scores might (contingently) drop exceeding the expected score-to-odds relationship – that is, the functional relationship between the generated score and the expected level of performance: the score thresholds for risk definition (i.e. the expected insolvency rates) were in fact set pre-Covid19. Therefore, for those in need to access credit during the pandemic,

[30] E.g. S. Barocas, A. Selbst, *Big Data's Disparate Impact*, in *California Law Review*, 2016, vol. 104, 671; M. Leese, *The New Profiling: Algorithms, Black Boxes, and the Failure of Anti-Discriminatory Safeguards in the European Union*, in *Security Dialogue*, 2014, vol. 45, iss. 5, 494–511; D.K. Citron, *Technological Due Process*, in *Washington University Law Review*, 2008, 85, 1249; T. Zarsky, *Transparent Predictions*, in *Illinois Law Review*, 2013, 1503, 1512; Id., *Transparency in Data Mining: From Theory to Practice*, in B. Custers, T. Calders, B. Schermer, T. Zarsky (eds.), *Discrimination and Privacy in the Information Society. Studies in Applied Philosophy, Epistemology and Rational Ethics*, vol 3. Springer, 2013, 301-324.

[31] Cfr. for the relation between Covid-19 and black swan theory: B.C: Halliburton, *COVID-19 is a Black Swan*, 19 March 2020, www.forbes.com; see also N. N. Talbeb, Y. Bar-Yam, The UK's coronavirus policy may sound scientific. It isn't., 25 March 2020, www.theguardian.com. *Contra*, D. Cameron, *COVID-19: A white swan, not a black swan*, 31 March 2020, www.rabble.ca.

[32] See G. Caracciolo, F. Cingano, V. Ercolani, G. Ferrero, F. Hassan, A. Papetti And P. Tommasino, *Covid-19 and Economic Analysis: a Review of the* Debate, 2020, www.bancaditalia.it.

scores used in the origination phase might operate on the basis of data that do not reflect their actual risk perspective.[33] The same trend might occur with roll-rate indexes (measuring the percentage of consumers who become increasingly delinquent on their account balances due) and with application scorecards: since the average risk threshold of the population (especially for self-employed individuals) is higher than normally, a flattening effect might take place, with significant effects on the development of pricing strategies for loans and credit more in general.

If, on the one hand, problems related to the score drop arise from temporary economic hardship (and, therefore, from quantitative information susceptible to recalibration), on the other hand additional concurring influencing factors pertain to the behavioural data that these algorithms exploit. Consider the effects of the Covid-19 in terms of stress and anxiety over the population: since behaviour scores are created utilising data through the credit cycle before the Covid-19 spread, abrupt variations in consumers' behavioural patterns (e.g. buying relevant amount of edibles and basic necessities in prevision of shortages in the supply chain) might be interpreted as symptomatic of irrational, non-strategic attitude and, therefore – along with the growth of the disbursement – lead to further drops of consumers' scores. In addition, stressed consumers might be willing to indulge in forms of delayed payment solutions or will seek for procrastination of their obligations (a strategy, which is further exacerbated by the "payment holiday approach" that many governments are promoting for mortgages and other expenses): this conduct will be interpreted as a lower propensity to-pay and therefore will affect payment projection scores. Since payments history accounts, for example, for 35% of the borrowers' *FICO* score, any sudden variation in the average expenditure will significantly impair the score for forthcoming months.

In the US, early investigations on the effects of the Covid-19 pandemic on credit applications conducted by the *Consumer Financial Protection Bureau* already showed significant drops (between 30 and 50 percent) in most categories, with relatively larger decreases among consumers with higher credit scores.[34]

In light of these events, the abovementioned predilection for payment holidays agreement, which currently represent the most viable solution promoted by government to face the economic effects of Covid-19, might as well reveal ultimately counterproductive for credit scores' functioning: even if payment holidays apparently offer short-term relief for temporary hardships, for those who will suffer severe long-lasting consequences (e.g. losing their job) the payment holiday is likely to cause an underestimation of clients probabil-

[33] Cfr. T. Maydon, *10 ways the COVID-19 crisis will affect your credit models (PART 1)*, 5 April 2020, www.insights.principa.co.za.

[34] See CFPB, *The Early Effects of the COVID-19 Pandemic on Credit Applications*, CFPB Office of Research Special Issue Brief, 1 May 2020, www.consumerfinance.gov.

ity-of-default rate for those months. This goes also for behavioral scores since, under a payment holiday agreement, expenditure perception is artificially adjusted downwards.
Lastly, indirect effects of individuals' consumeristic perspective arising from transitions in their professional activity should be taken into account: reduction in consumers' expenditure throughout the pandemic – in particular during the lockdown phase – has a direct effect in terms of sales contraction, and this is likely to affect counterparties' profit forecasting and budget models, conditioning their private activity as well. In such a situation, algorithmic models considering the expected income as a constituting factor for the score might fail to foresee how retailer will perform post-lockdown – especially for those operating in delicate sectors such as tourism[35] - and therefore underestimate its financial worthiness in case of application for credit. As another manifestation of the 'snowball effect' consumers' economic hardships determined by the lack of resources and credit will reverberate on the industry has a whole, undermining its ability to endure Covid-19 effects.

3. Strategies to reduce adverse impact of traditional scoring system during (and after) the pandemic outbreak

As we have seen, algorithmic credit scoring systems might significantly mis-perform in light of the Covid-19 effects, due to quantitative factors related to expenditure as well as to qualitative determinants, since consumption under crisis do not follow traditional psychological and behavioural patterns. This is susceptible to lead to several spillover harmful effect, both on consumers and on the market more in general.
Such contingent problem operates on top of the persisting uncertainty regarding the governance of credit scoring algorithm for creditworthiness assessment in the European Union: despite a broad request for indications by scholars and consumer interest groups, regulation in this field is still largely remitted to credit bureaus' discretion.[36] Risks arising from the delay in issuing rules for this technology are further exacerbated by the current crisis, considering that environmental and behavioural data can produce significant oscillations on credit scores.
Foreign countries that in the past promoted a stronger effort in the regulation of scoring algorithms are already recurring to centralized solutions in order to deal with the Covid-19 effects on credit scoring: the People's Republic of China, which has been investing for

[35] Cfr. N. Fernandes, *Economic Effects of Coronavirus Outbreak (COVID-19) on the World Economy*, 22 March 2020, www.ssrn.com.

[36] H. Aggarwal, *Machine Learning, Big Data and the Regulation of Consumer Credit Markets: The Case of Algorithmic Credit Scoring*, in H. Aggarwal, H. Eidenmüller, L. Enriques, J. Payne, K. van Zwieten (eds.) *Autonomous Systems and the Law*, Beck, 2019.

years into developing a Social Credit System (SCS) to represent the social and economic condition of citizens,[37] introduced a set of special provisions to amend the standards of the SCS. These accommodations mostly consist of exemptions on penalties that would otherwise be inflicted under the normal operativity of the system, presuming that such adverse behaviours are caused by the coronavirus outbreak (e.g. preventing any reduction of the social credit score for firms that fail to pay social insurance or taxes due to the coronavirus).[38]

The United States government promoted some initiatives on a federal level within the framework of the Cares Act,[39] requiring lenders and creditors who agree to account forbearance or modified payments must treat those obligations as "current" if the consumer has trouble making a full payment during the Covid-19 crisis.[40] Yet, a major intervention specifically focused on credit scoring reporting obligations was expunged from the regulation, seemingly due to apparent pressure from the lending industry.[41]

In the European Union, in its recent statement[42] the European Banking Authority clarified that any acceptance of temporary measures for loan reclassification from a prudential perspective should not automatically lead to negative implications for the consumer's credit rating, but did not provide any further indication.

As for initiatives arising from private parties, score modelers and CRAs are implementing - besides the abovementioned payment freeze strategies – adjustments on their traditional models based on approaches applied on territories affected by natural catastrophes (hurricanes, floods, fires, tornadoes);[43] in addition, guidelines are issued for clients, suggesting responsible conducts to preserve their credit score (check credit regularly, promptly dis-

[37] See *ex multis* F. Liang, V. Das, N. Kostyuk, M.M. Hussain, *Constructing a Data-Driven Society: China's Social Credit System as a State Surveillance Infrastructure*, in *Policy & Internet*, 2018, vol. 10, iss. 4, 415.

[38] A. Chipman Koty, *China's Social Credit System: COVID-19 Triggers Some Exemptions, Obligations for Businesses*, 26 March 2020, www.china-briefing.com.

[39] Public Law No: 116-136, 27 March 2020, *Coronavirus Aid, Relief, and Economic Security Act or the CARES Act,* H.R.748 – 116th Congress.

[40] H.R. 748 § 4021, Coronavirus Aid, Relief, and Economic Security Act (CARES Act): "*Under this section, furnishers [of information] to credit reporting agencies who agree to account forbearance, or agree to modified payments with respect to an obligation or account of a consumer that has been impacted by COVID-19, report such obligation or account as "current" or as the status reported prior to the accommodation during the period of accommodation unless the consumer becomes current. This applies only to accounts for which the consumer has fulfilled requirements pursuant to the forbearance or modified payment agreement. Such credit protection is available beginning January 31, 2020 and ends at the later of 120 days after enactment or 120 days after the date the national emergency declaration related to the coronavirus is terminated*".

[41] J. Bykowicz, T. Mann, *No Coronavirus Break for Consumer Credit Scores*, 31 March 2020, The Wall Street Journal; B. Fredericks, *Lenders blocked plan to protect Americans' credit scores amid coronavirus*, 31 March 2020, The New York Post.

[42] See *footnote* 16.

[43] Consumer Data Industry Association, *Helping Consumers Avoid Credit Problems if They Have Been Impacted by Coronavirus (COVID-19),* 29 March 2020, www.cdiaonline.com.

pute any incorrect information; communicate any relevant event to service providers),[44] and customers are offered free weekly credit reports to help them protect and monitor their financial health.

Lastly, many private operators engaged into treating any Covid-19-related forbearance plan and deferred payment neutrally. However, without a mandatory prescription to act, these obligations are remitted to privates' autonomy and discretion. Furthermore, without any duty on clients to signal in advance any potential significant event related to credit to professional counterparties, the risk of a structural misalignment of scoring algorithms is still present.

Harmful effects of badly determined/distorted scores during the pandemic invest both consumers and credit operators: consumers are precluded from accessing credit in a moment of financial distress; banks and other institutions are not able to properly discriminate between the quality of potential borrowers, therefore facing risks of overexposure to losses and unprofitable operativity.

In order to prevent a further worsening of the (already distressed) global economic health, it is therefore pivotal to promptly introduce harmonized corrective measures to mitigate the risk of deviation in the credit scoring sector.

First, performance identification of essential rates for credit scoring as defined by the Basel Accords (probability of default, loans loss given default, exposure at loss, default timing, etc.) shall be redefined in accordance with variations determined by the pandemic. This can be achieved by means of gathering vintages and conducting a preliminary analysis on the score-to-odds relationship existing between pre-covid and post-covid credit default for traditionally "stable" customers.

Once new default rates are determined, models will then require a refresh of back-testing as long as data mature to validate their continued usage.

These activities should be conducted by means of a dynamic approach, with regular updates and adjustments on the basis of further data on credit emerging during and in the early aftermath of the pandemic, and subsequently might require alignment or rebuild in short term outcome windows. Constant monitoring and adjustment are essential to preserve scoring algorithms' stability, accuracy and predictive power over the pandemic, and to ensure early warning triggers when models move away average thresholds. At the same time, other measures meant at maintaining the quality of data (e.g. expunging 2020 data from future datasets as soon as the economy gets more stable) over and after the pandemic shall be subject to constant investigation, and implementation into normative prescriptions, in order to ensure a concerted response that will be essential to preserve access to credit as a fundamental tool for economic recovery in the forthcoming years.

[44] Fico, *Protecting Your Credit during Coronavirus Outbreak*, 13 March 2020, www.fico.com; Experian, *Protecting Your Credit During the COVID-19 (Coronavirus) Crisis*, 2020, www.experian.com.