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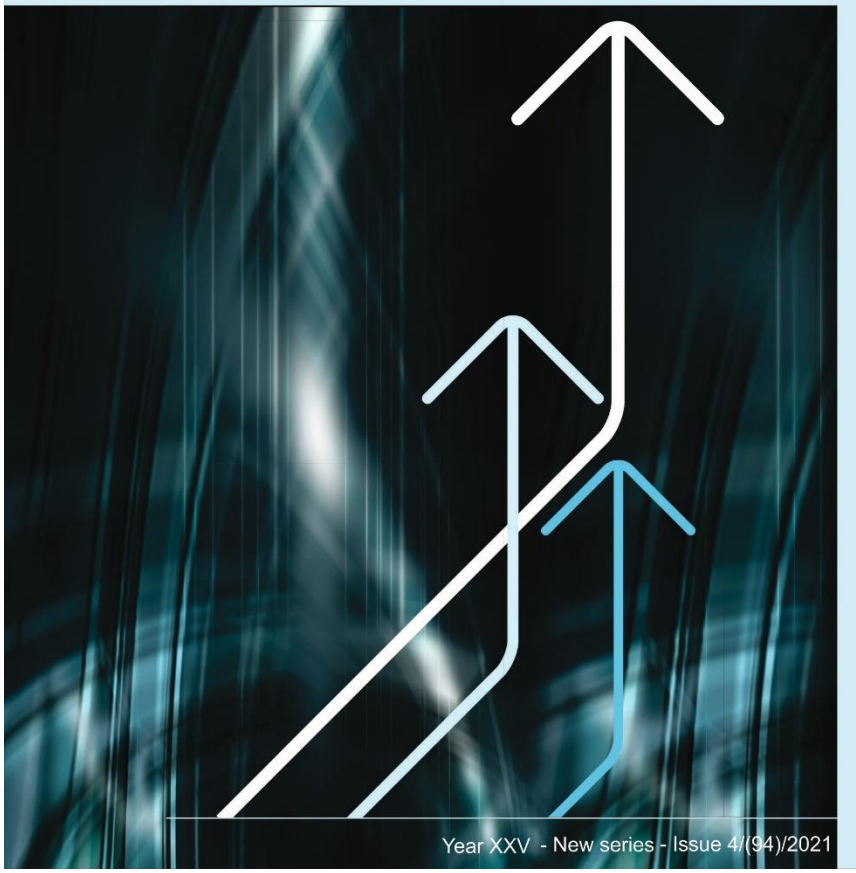

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“VICTOR SLĂVESCU” CENTRE FOR FINANCIAL
AND MONETARY RESEARCH

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Contents

THE ACTIVITY OF VICTOR SLĂVESCU - ECHOES FROM HIS EPOCH

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Abstract

This year we celebrate 130 years since the birth of Victor Slăvescu, one of the most prominent Romanian economists. His various activity took place over a period of time marked by a succession of exceptional events: two world wars, the Great Union of 1918, the interwar period and the beginning of communism. It was an epoch characterized by profound transformations of the economic, political and social system. We take a look at his publishing activity, his career, the recognition he gained from his peers and the general public. In this paper we use mainly archive sources to uncover some long-forgotten perspectives on the life and work of Victor Slăvescu.

Keywords: economic thinking; Romanian economist; Minister of Finance

JEL Classification: B20; B30; B31

1. Introduction

As Victor Slăvescu himself noted, the appreciation of a person's activity in the socio-economic field must take into account "the political circumstances in which he lived, thought and manifested, as well as the decisive factors that may have exerted certain effects on both man

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and on its work" (Slăvescu, 1941). His most intense activity overlapped with a succession of exceptional events: two world wars, the Great Union of the Romanian historical provinces in 1918, the interwar period and the beginning of communism. It was an era characterized by profound transformations of the economic, political and social system.

In a period marked by instability, Victor Slăvescu supported "Romanian economic nationalism" and dedicated monographs to important economists of the nineteenth century (Ștefănescu, coordinator, 1978). Slăvescu left his mark on the national credit system, worked for the national bank of Romania, was minister of finance, university professor and member of the Romanian Academy. However, his activity was less recognized by contemporaries, but later volumes and monographs were dedicated to him.

We document the activity of Victor Slăvescu and reflections of other important personalities of the era in which he lived using a research methodology based on exploring archive sources to uncover some long-forgotten perspectives on his life and work. Although based mainly on bibliographic exploration, the methodology used for this study also consisted in identifying the main trends reflected in the documents of the time, in reflecting the personality of the famous economist in his work, enriching the study with examples structured in several distinct stages. The publishing activity, his career, the recognition Victor Slăvescu gained from his peers and the general public is highlighted by presenting some relevant elements structured in main historical periods and key fields.

2. Professional activity in the interwar period

Anticipating somewhat subsequent developments, in an interview in 1931, Victor Slăvescu stated that "If I ever had the task of dealing with state finances I would start with significant tax cuts, because I am deeply convinced that small rates always give abundant income and by no means large rates. But once the rates were reduced, I would pay so much attention to taxation that I would almost eradicate - I do not say completely - tax evasion" (Românul, 1931).

In a review of one of his important works (History of the National Bank of Romania 1880-1924) it is said that "any honest contribution to the unbridled field of Romanian financial science is welcome, but especially those of Mr. Victor Slăvescu, for that it always represents

the fruit of laborious and objective researches of a deep connoisseur of Romanian finances" (Adevărul, 1925).

Practical experience and academic training allowed the Minister of Finance Victor Slăvescu to prepare the "Law of May 8, 1934", a law considered necessary for banking control, which later underwent changes to incorporate changes in the system. However, the way in which it was conceived was appreciated by the specialists of the time: "for that epoch and for the necessities that were imposed then ... it was of a real use" (Constantinescu, 1943). The realization of the draft state budget during his time as Minister of Finance was an important challenge, in a difficult context. His intransigent attitude was noted in that context: "... to the colleagues who want to move him from the attitude he has set, he answers: with me this is what it is possible; if you want otherwise, get another finance minister" (Scrutător, 1934).

In an interview given towards the end of 1930, Victor Slăvescu concluded about the world economic crisis: "I think we are going through an epoch-making period. I think now we will have to get rid of all the mistakes that have been made. I believe that this crisis will end one era of human life to open another. Which?" (Adevărul, 1930).

A liberal economist, faithful to his deep convictions, Victor Slăvescu resigned as head of the Ministry of Finance in February 1935, disappointed by the policy changes and the mentality of his employees and collaborators. Gheorghe Tătărescu, prime minister at the time, described him as "too much of a teacher, too much of an orthodox" (Isărescu, coordinator, 2001). The attempts of Victor Slăvescu, the "methodical and calm professor", to reform the system are appreciated in the newspapers of those times, where his calm and abilities are mentioned in relation to the request to the financial administrations to centralize taxpayers who do not pay their contributions to the state: "Mr. Slăvescu, a considered and thoughtful man, did not decide on such a measure, which we continue to describe as revolutionary, under the impression of a moment of upset. He stayed, he calculated well, he considered the effects and consequences, the inconveniences and dangers and then he made the decision" (Batzaria, 1935). In fact, his calmness, but also his ability to be objective are recognized by Iorga (1939) in his memoirs about the period 1931-1932: "calm objective presentation, to the budget, of Slăvescu", "calm exposition of the liberal Slăvescu", and the "objective exposition" about the history of the National Bank is appreciated by Gheață (1929) ten years earlier.

His native qualities reflected in the professional activity are also highlighted in related, negotiation activities. In this sense, Ion I. Nistor thanks "my colleague Victor Slăvescu, who, with his efforts and his sense of conciliation, contributed" to the settlement of a long conflict between the Romanian Academy and the Elias Foundation (Romanian Academy, 1946, p.16).

3. Victor Slăvescu, the historian of Romanian finance

From a very young age, Victor Slăvescu managed to stand out through his writings. In a 1911 review it was noted that "From the Waves of Life", scaled by Mr. Victor I. Slăvescu is a reasonable documentation of the whirlwind of class struggles (Românul, 1911).

Around the age of 45, Victor Slăvescu was already considered by the great economists of the time "the historian of Romanian finance" (Madgearu, 1936). In 1937 was published a work that synthesizes and classifies the publishing activity of Victor Slăvescu, depending on the appearance in volumes or in the form of articles, considering the discipline where the works could be classified ("currency, credit, exchange and bank", "enterprises", "transports", "national economy", "various"), all occupying "a prominent place in the Romanian economic literature", being characterized by "clear method of exposition", "clarity of style, with real literary features" and "defending the ideology of economic nationalism" (Pașcu, 1937).

His publications on the life and work of Romanian economists in the nineteenth century were well received and appreciated. Budu (1939), in his intervention on the work "The life and work of Petre Mavrogheni" concludes that "this work is not only a safe guide for researchers and the general public, but also a model of the genre in Romanian economic science." Drossu (1947), writing about Victor Slăvescu's work "The life and work of the economist Alex. D. Moruzi 1815-1878", appreciates that the author "besides the university courses, still finds time to let himself be stolen by the charm of the old Romanian manuscripts" and succeeds "with the same preparation with which he knew how to flourish the Industrial Credit or to replace the cumbersome and expensive over-tax" to finalize a monograph considered "the best and most complete work on this typical representative of our liberal economic school".

The opening of a new path for that period - the history of Romanian economic thought, is appreciated and encouraged. The

great economist Costin Murgescu (1943) considered that Victor Slăvescu "opened a chapter in the evolution of our economic thinking, which no one can close today", his texts being characterized by a "serene objectivity" and accompanied by the presentation of people "put in the light and ambiance of the age." According to the quoted article, Victor Slăvescu, through his hard work, managed to "lift the fog from some of the most interesting figures of our few economic thinking: Ion Ghica, Dionisie Pop Marțian, N. Șuțu, Petre Mavrogheni and B. P. Hașdeu".

4. Victor Slavescu's influence on the credit system

His focus on the monetary field and the history of Romanian finances, as well as the experience gained over time, including as a director at Banca Românească and the National Industrial Credit Society, have left their mark on Victor Slăvescu's contributions to the development of credit organization theory in Romania and the cooperative movement. In this sense, Murgescu states that "Victor Slăvescu defines (…) his conception regarding the role of the great Romanian finance in solving the vital problems of the national economy after which he elaborates the first, most complete and most important monograph of our credit system" (Murgescu, 1994, p 58).

The activity carried out at the National Industrial Credit Society is recognized by personalities from the Romanian industry: “the increase of the credits granted ..., started under the leadership of Mr. Victor Slăvescu, ..., must be continued, if we want our riches to be valued and with the help of national capital” (Constantinescu, 1939).

In "Romania's Credit Organization", a book published in Bucharest in 1922, he addresses the problem of modernizing the credit system in Romania by transforming the old usurious credit system. As a good organizer, it defines the program and pathways for post-war reconstruction, and sets out 15 guiding principles that should define the functioning of a credit institution and whose interpretation remains equally current. In this sense, it was recommended to avoid transforming the credit institution into a party instrument; its objective must be the financing of enterprises, and its activity must always be conducted on the basis of the principle of prudence and balance (Isărescu, 2001).

5. Victor Slavescu's connection with the Romanian Academy

The year 1939 was a special one for Victor Slăvescu, who was appointed a full member of the Romanian Academy at the proposal of Alexandru C. Cuza; in 1936 he had become a corresponding member at the proposal of Dimitrie Gusti. The regulations of the Romanian Academy provided at that time the existence of a limited number of academics, and only a few years before the number of full members increased from 12 to 15, which made it possible to accept Victor Slăvescu, without him having a predecessor (Rugină, 1980). The installation of communism led to the dissolution of the Romanian Academy on June 9, 1948 and the establishment of the Academy of the Romanian People's Republic; a consequence of this fact was the withdrawal of the title of academician for 19 personalities, including Victor Slăvescu (Nistor, 2003). After the 1989 Revolution, on January 5, 1990, the old Romanian Academy was restored to its rights, and on February 2, 1990, after more than half a century, the 19 members were restored to their titles.

A tribute that has a special note can be found in the greeting addressed by Barbu Solacolu (1937) on the occasion of the election of Victor Slăvescu as president of the General Union of Industrialists in Romania: "In the country where lawyers, engineers and doctors - and this without any shadow of envy - they had the step in the command functions of the State and of the public life in general - you are Mr. President, the first career economist, who has succeeded". Victor Slăvescu's response to Solacolu's praises includes a key element, which is worth noting: "Of the many aspects under which you presented me and among the many lines of characterization with which you presented me, I would like you to remember only one, the one that is most dear to me, the one in which I would like to stay until the end, only one: that of an economist. No other quality is dearer to me than being an economist. And if I was able to record certain stages - ascending and stopping, maybe even descending - in my career, I did these stages only as an economist. I could give up everything: the political career, which you talked about, and which is very unsympathetic to me, and the career of a minister, which is indifferent to me. I could never give up that of an economist, because no human satisfaction can surpass that which the library and objective, quiet scientific research studies give you". Slăvescu's conclusion is clear: "Gentlemen, I tell you

that wherever I want to be and no matter how long I live, I want to be and remain an economist!"

The activity carried out by Victor Slăvescu at the Romanian Academy is appreciated by his colleagues. For example, in the meeting of May 31, 1938, the academician Alexandru Lapedatu, the president of the Romanian Academy at that time, and the academician Ion I. Nistor thank him for the effort made to build the budget of the Academy on new bases and the proposals to modernize the accounting service (Romanian Academy, 1939). The accounting system of the Romanian Academy continued to change, and at the meeting of May 19, 1943, at the recommendation of Victor Slăvescu and Gheorghe Ionescu-Şişeşti, agricultural accounting was approved (Romanian Academy, 1943).

6. The period after 1944

When he became a member of the Board of Directors of the National Bank of Romania in 1945, Ion Lapedatu, the bank's governor at the time, greeted him with a speech in which he acknowledged both his training and economic experience and "a workforce few equaled" (Isărescu, coordinator, 2001).

After 1944, with the turn of an important page in the history of Romania, Victor Slăvescu's activity is reflected in the press of the time from another perspective. In an article meant to highlight the importance of nationalizing banks, published in the main communist newspaper of the time, Victor Slăvescu was placed among the Romanians "who served the interests of German financial capital" (Năvodaru, 1944).

Professor Anghel Rugină recalls the discretion and dignity that marked Victor Slăvescu's personality, especially during the socialist regime established after 1944: during the socialist regime "he was unable to publish anything because of his intransigent position" but he continued his research activity. He refrained "from expressing any public opinion about the new changes in the country, which of course was not to his liking after having lost everything" (Rugină, 1980, p.229).

Throughout his career, Victor Slăvescu was accompanied by his wife Valentina, the daughter of Liberal Senator Mihai Orleanu. Especially after 1944, she supported him in his scientific work with remarkable devotion. In this sense, Rugină (1980) remarks: "Without doubt she will remain in Romanian history as an outstanding example

of unselfishness and complete devotion to family and the work of her husband."

7. Posthume recognition

The life and works of Victor Slăvescu are not an unchartered territory. He was prolific in writing; his career was extremely complex and all these efforts led to a significant amount of works dedicated to his activity.

Years later, in a volume dedicated to the economic history of Romania between 1859-1938, the economist Victor Axenciuc (1999), honorary member of the Romanian Academy, places Victor Slăvescu among the "specialists of the time", "outstanding personalities" of his time, together with Virgil Madgearu, Mitiță Constantinescu, Ion N. Angelescu, Constantin I. Băicoianu or Gheorghe Tașcă.

The institutions that had him as a member or manager continue to pay a tribute to his memory in various ways:

- The Romanian Academy named one of its research institutions after him (“Victor Slăvescu” Center for Financial and Monetary Research) and also one of its prestigious yearly prizes. It also published a reference book regarding his life and work (Văcărel, 2003).
- The National Bank of Romania published an important work dedicated to Slăvescu (Isărescu, 2001) and also keeps an impressive number of his works in the institution’s library.
- The Bucharest University of Economic Studies named one of its important buildings (housing the Faculty of Business Administration) and a reading room after the celebrated economist.

8. Conclusions

This paper contributes to the economic literature by bringing back to present some relevant evidence reflected in the literature and periodicals of the time in which Victor Slăvescu lived, in a synthetic manner that highlights the relevant elements structured in periods and key fields. The role and impact of his work in economic and academic

life is a remarkable one, even if sometimes criticized. His entire activity must be viewed and appreciated taking into account the very special times in which he lived and worked: World War I followed by the Great Union of the Romanian principalities, the interwar period, World War II and the beginning of communism. Certainly, Victor Slăvescu remains in the memory of the times as a good professional, a good economist and an appreciated teacher.

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APPENDIX

Key dates in the life of Victor Slăvescu

- Born on May 23 / June 5, 1891 in Rucăr, Muscel county – died on September 24, 1977 in Bucharest
- 1911: begins higher education in France, at Paris University
- 1915: assistant accountant at Banca Românească
- 1915: joins the National Liberal Party
- 1916, August: volunteer officer (World War I)
- 1923: he marries Valentina Orleanu, the daughter of the deputy Mihail Orleanu and receives the mansion and the estate from Cotești
- 1923 - 1933: director of the National Industrial Credit Society (known as Industrial Credit)
- 1925: associate professor at the Academy of Higher Commercial and Industrial Studies in Bucharest (he completed all teaching degrees until he became a professor - 1931; in 1947 he was removed from education)
- 1927: is elected deputy for the first time
- 1933, November 14 -1934, January 5: Undersecretary of State at the Ministry of Finance
- 1934, January 5 - 1935 February 1: Minister of Finance
- 1934: Grand Officer of the Legion of Honor
- 1936 is elected president of the General Union of Romanian Industrialists (UGIR)
- 1936, May 23: corresponding member of the Romanian Academy
- 1937: becomes vice-president of the Superior Banking Council and of the Economic Council
- 1939, May 20: full member of the Romanian Academy
- 1939, February 1 – 1940, July 4: Minister of the Army's endowment in six successive governments
- 1944, January-October: rector at the Academy of Higher Commercial and Industrial Studies in Bucharest
- 1945-1946: National Bank of Romania, member of the Board of Directors
- 1947: forcefully removed from teaching
- 1950, June – 1955, October: imprisoned in Sighet prison

OPTIMAL HEDGE RATIO IN TURKISH STOCK INDEX FUTURES MARKET: A DECO-FIAPARCH APPROACH

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Ahmet Furkan SAK**

Abstract

This paper adopts a new approach called DECO-FIAPARCH model for estimating the optimal hedge ratio (HR) in Turkish Stock Index Futures market in the presence of asymmetry and long memory. The study covers the period from May 3, 2005 until April 4, 2019, total of 3,508 daily observations. The DECO-FIAPARCH model shows that, on average, a $1 long position in the spot market can be hedged for $0.95316 with a short position in the futures market. Furthermore, optimal hedge ratio is time-varying and takes value between 0.52258 and 1.5263. This demonstrates that investors should revise their positions actively by considering the fluctuating cross correlations in spot and futures markets.

Keywords: Time-Varying Hedge Ratio; Asymmetry**;** Long Memory; Fractional APARCH

JEL Classification: G10**;** G11**;** G13

1. Introduction

It is an undeniable fact that risk management is gaining more importance than ever before in the recent years. The growing interdependence of financial markets forces the investors who want to invest in portfolios of assets to face considerable amount of risk which has never been experienced before. As a hedge for the risk of price

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changes in the spot markets, many investors have started to follow stock index futures more closely. Through hedging, in other words investing in the spot market and taking an opposite position in the futures market at the same time, the investors try to minimize their risk. The crucial step of this hedging mechanism is to determine the optimal hedge ratio, which is essentially obtained from the coefficient of the regression between the change in the stock prices and the change in the hedging instruments (Hatemi-J. and Roca, 2006). However, the main question remains as to how many hedging instruments to use to manage stock price fluctuations in an optimal way. In this context, many studies have investigated how to find the best hedging strategy.

This study aims to investigate the hedging effectiveness of the Turkish derivative market with a dynamic model considering that information shocks, which may change depending on time and are eliminated at a hyperbolic rate, and have an asymmetrical structure. Although there is extensive literature on the hedging efficiency of the Turkish derivatives market using models such as OLS, VECM, GARCH, the number of studies that consider both conditional correlation and long memory in the calculation of the optimal hedge ratio is very few. The ARCH effect and long memory features in financial asset returns make it difficult to calculate a robust hedge ratio with models such as OLS, VECM, and GARCH. For this reason, this study will fill this gap in the literature by considering both conditional correlation and long memory in the calculation of the optimal hedge ratio.

In the following parts of the study, the literature review on optimal hedge ratio calculation, research methodology, results, and conclusion will be given, respectively.

2. Literature review

The literature on optimal hedging is generally separated into two groups: static methods and dynamic methods. Static methods suggest that the hedge ratio is fixed and not dependent on time which makes the calculation of a single hedge ratio sufficient. The first example of this kind of strategy is applied by Ederington (1979). He employed OLS model to estimate the hedge ratio minimizing risk. His results prove that the OLS method performs better than one-to-one hedge ratio for reduction of variance. Ederington (1979)'s OLS method has been followed by many authors as it is easy to implement e.g., Hill

and Schneeweis, 1982; Figlewski, 1984; Toevs and Jacob, 1986; Benet, 1992. Nevertheless, in the OLS method, the cointegration between the spot market and futures markets is not taken into account. Moreover, it ignores the fact that the financial variables frequently display a unit root and time-varying variance-covariance structure which in turn result in model misspecification (for details please refer to Engle, 1982; Engel and Granger, 1987).

In order to overcome the deficiencies of OLS method, Ghosh and Clayton (1996), Lien and Tse (1999), Yang (2001), Floros and Vougas (2004), Lee et al. (2010), Degiannakis and Floros (2010), and Kostika and Markellos (2013) employed error correction model (ECM). ECM was observed to generate better results in nonstationary and cointegrated time series. By taking the long term cointegration term into account, Floros and Vougas (2004), Yang and Allen (2004), Bhaduri and Durai (2008), Degiannakis and Floros (2010), Prashad (2011) calculated the hedge ratio with vector error correction model (VECM).

As the static methods mentioned above focus only on minimizing the risk while calculating the hedge ratio, they disregard the time-varying change in the price and also overlook its effect on expected returns (Cecchetti et al., 1988). Therefore, Baillie and Myers (1991), Park and Switzer (1995), Haigh and Holt (2002), Rossi and Zucca (2002), Tse and Tsui (2002), Yang and Allen (2004), Degiannakis and Floros (2010), Prashad (2011), Gok (2016), Basher and Sadorsky (2016), Kharbanda and Singh (2018) and many others used models such as GARCH, BGARCH, VEC-GARCH, CCC-GARCH or DCC-GARCH to capture the dynamic nature of the prices. Although it is not easy to compute hedge ratio due to their complex algorithms, these dynamic models are generally shown to outperform the static models by taking conditional heteroskedasticity into account.

Compared to the models mentioned above, Engle and Kelly (2012) introduced a relatively new model called Dynamic Equicorrelation GARCH (DECO GARCH). DECO GARCH model is an advanced case of DCC model of Engle (2002) and cDCC model of Aielli (2013). Our empirical analysis adopts the Fractionally Integrated Asymmetric Power (FIAPARCH) model combined with the DECO. The study uses the FIAPARCH model rather than GARCH type models because of two reasons. First of all, the FIGARCH model counts in the long memory in the volatility of the return series (Hammoudeh et al., 2016). Although GARCH type models assume that a shock to financial time series disappear rapidly, fractionally integrated models suggest

that shocks exposed by financial time series does not decline to zero exponentially and the decline is hyperbolically. The second reason is the asymmetry effect. GARCH type models have an important restriction of considering positive and negative shocks as equally important. Yet, it has been discussed that the volatility caused by a negative shock is expected to be higher than a positive shock of a similar size (Brooks, 2014).

To the best of our knowledge, this paper is the first to employ Dynamic Equicorrelation (DECO)-Fractionally Integrated Asymmetric Power ARCH (FIAPARCH) model for calculation of time-varying hedge ratio.

This paper is organized as follows. After the literature review presented in Section II, Section III includes the empirical method for DECO-FIAPARCH model. Section IV includes the empirical results of spot and futures markets. Section V reports and discusses the empirical results. Lastly, Section VI provides concluding remarks.

3. Methodology and data

3.1. Data

The series analyzed in the study are the daily spot and futures prices for the ISE-30 index. The data is taken from Bloomberg. Our sample period covers the period from first trading day of Turkish stock index futures market which is May 3, 2005 until April 4, 2019, summing up to 3,508 daily observations.

3.2. Model Specifications

Assume that for $t = 1, \dots, T, E_{t-1}[\varepsilon_t] = 0$ and $E_{t-1}[\varepsilon_t \varepsilon_t'] = H_t$, where $E_t[.]$ is the conditional expectation which uses the information set available at time t. The asset conditional variance-covariance matrix H_t is expressed as:

$$H_t = D_t R_t D_t \quad (1)$$

where $R_t = [P_{ij,t}]$ is the conditional correlation matrix and the diagonal matrix of the asset conditional variances is given by $D_t = diag(h_{1,t}, \dots, h_{n,t})$.

Engle (2002) uses the right-hand side of Eq.(1) instead of H_t by putting forward the dynamic correlation structure called DCC.

$$R_t^{DCC} = (Q_t^*)^{-1/2} Q_t (Q_t^*)^{-1/2}, \quad (2)$$

$$Q_t^* = Diag[Q_t], \quad (3)$$

$$Q_t = (1 - \alpha - b)S + \alpha u_{t-1} u'_{t-1} + bQ_{t-1}, \quad (4)$$

where $u_{i,t}$ are the std. residuals, $S = [s_{i,j}] = E[u_t u'_t]$ is the nxn unconditional covariance matrix of u_t and a and b are no negative scalars fulfilling $a > 0$, $b \geq 0$, $a + b < 1$.

Within this context, Aielli (2013) demonstrates covariance matrix Q_t estimation in the method is unstable as $E[R_t] \neq E[Q_t]$ and recommends a model called cDCC which is consistent with the correlation-driving process.

$$Q_t = (1 - a - b)S^* + a\left(Q_{t-1}^{*1/2} u_{t-1} u'_{t-1} Q_{t-1}^{*1/2}\right) + bQ_{t-1} \quad (5)$$

where S^* is the conditional covariance matrix of $Q_t^{*1/2} u_t$

Engle and Kelly (2012) propose modeling ρ_t with the help of DCC model of Engle (2002) and its cDCC modification proposed by Aielli (2013) to create a conditional correlation matrix Q_t and after that taking the mean of its off-diagonal elements in order to lessen the estimation time by simplifying the procedure. This method is named as dynamic equicorrelation (DECO) model, and written as:

$$\begin{aligned} \rho_t^{DECO} &= \frac{1}{n(n-1)} (J_n R_t^{cDCC} J_n - n) \\ &= \frac{2}{n(n-1)} \sum_{i=1}^{n-1} \sum_{j=k+t}^{n} \frac{q_{kl,t}}{\sqrt{q_{kk,t} q_{ll,t}}} \end{aligned} \quad (6)$$

where $q_{kl,t}$ is the (k,l)[th] element of the matrix Q_t from the cDCC model.

Afterwards, conditional correlation matrix should be estimated. For that, following equicorrelation is implemented:

$$R_t = (1 - \rho_t) I_n + \rho_t J_n \quad (7)$$

where J_n is the nxn matrix and I_n is the identity matrix with n-dimension.

The presupposition of equicorrelation results in a less complex likelihood equation when ρ_t is acquired by Eq. (8):

$$L = -\frac{1}{T}\sum_{t=1}^{T}(\ln(1-\rho_t)^{n-1}(1 + (n-1)\rho_t))\frac{1}{1-\rho_t}\left(\sum_{k=1}^{n}\varepsilon_{k,t}^2 - \frac{\rho_t}{1+(n-1)\rho_t}\left(\sum_{k=1}^{n}\varepsilon_{k,t}^2\right)\right) \quad (8)$$

Baillie et al. (1996) suggested fractional integrated GARCH (FIGARCH) model for specifying long memory in return volatility. GARCH model is expressed as an ARMA (*m*,*p*) for squared error form

$$[1-\alpha(L)-\beta(L)\varepsilon_t^2] = \omega + [1-\beta(L)v_t] \quad (9)$$

where $v_t = \varepsilon_t^2 - \sigma_t^2$.

FIGARCH model results from standard GARCH model with fractional difference operator, $(1-L)^d$. Thus, FIGARCH model can be displayed as follows:

$$\emptyset(L)(1-L)^{\bar{d}}\,\varepsilon_t^2 = \omega + [1-\beta(L)]v_t \quad (10)$$

where $\beta(L)$ and $\emptyset(L)$ are the finite order lag polynomials with roots presumed to be placed outside of unit circle and d is the long memory parameter and $(1-L)^{\bar{d}}$ is the fractional differencing operator.

FIGARCH $(p,\bar{d},q)$ model turns into standard GARCH when $\bar{d}$ = 0 and IGARCH model when $\bar{d}$ = 1.

On the other hand, Tse (1998) claimed that the response o stock volatility to positive and negative shocks are asymmetrically and suggested the Fractionally Integrated Asymmetric Power (FIAPARCH) model. As negative shocks cause stock volatility to increase more compared to positive shocks, taking asymmetry effect into account along with long memory generates better results.

The Fractionally Integrated Asymmetric Power (FIAPARCH) (p,d,q) model is represented as follows:

$$h_t^{\delta/2} = \omega[1-\beta(L)^{-1} + [1-[1-\beta(L)]^{-1}\emptyset(L)(1-L)^d](|\varepsilon_t| - \lambda\varepsilon_t)^{\delta} \quad (11)$$

where $\omega, \beta, \emptyset$ and d are parameters that are needed to be determined.

The parameter d where $0 \leq d \leq 1$ tests the validity of long memory in the conditional volatility, δ stands for power term of returns for assumable structure in the volatility persistence, L represents the lag operator, and λ>0 denotes to the asymmetry parameter implying that stock volatility rises higher in negative shocks than positive shocks of similar size.

4. Results and discussion

First of all, the log returns are computed for spot and futures markets returns. Table 1 shows statistical properties related to the return series.

Table 1

Statistical Properties for Spot and Futures Markets Returns

	Spot Market Returns	Futures Market Return
Mean	0.000383	0.00039096
Maximum	0.12725	0.09657
Mininum	-0.10902	-0.097824
S.D.	0.017421	0.017415
S	-0.17253	-0.16795
K	3.4645	3.4504
Jarque-Bera	1771.8***	1756.6***
ADF	-33.6253***	-33.5158***
KPSS	0.0709367	0.0631605
Q (20)	35.3949***	31.6826***
Qs (20)	1231.91***	1319.60***
ARCH (20)	26.521***	28.187***

***Note**: S.D. refers to Standard Deviation, S and K are Skewness and Excess Kurtosis. Q (20) and Qs (20) are the empirical statistics for the LB test for spot and futures return autocorrelation and sqr. returns series, respectively. ADF refers to the unit root test and KPSS refers to the stationarity test. ARCH(20) test controls the ARCH effects. *** refer to the rejection of the hypothesis of "normality, homoscedasticity and no autocorrelation at the 1% significance level.*

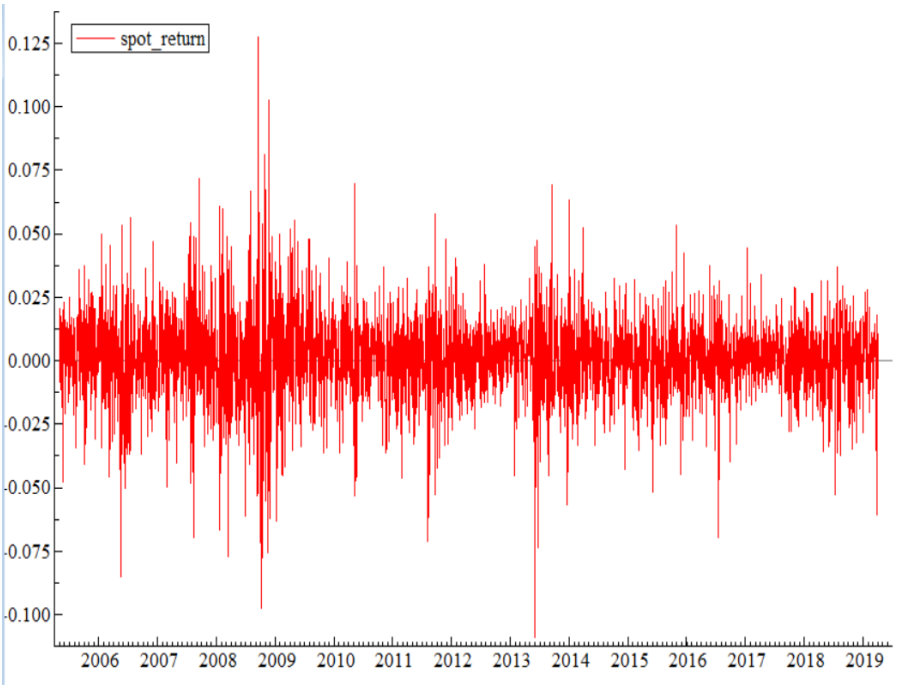
It can be seen that average daily returns are positive throughout the sample period selected. The skewness results are negative for the whole return series along with that the spot and futures return series have very high excess kurtosis values. This result and the JB test statistics implies that the distribution function of spot and futures return series are leptokurtic and skewed. Thus, the null hypothesis which

suggests “normality” is rejected. Additionally, the ADF unit root test suggested by Dickey and Fuller (1979), and the KPSS stationarity test suggested by Kwiatkowski et al. (1992) are implemented. These findings show that all return series are stationary. Moreover, so as to conclude for existence of ARCH effect, serial correlation in the residual term is examined. According to the results, there is a significant autocorrelation and existence of ARCH behavior in the entire markets just as supported by the Ljung-Box statistic. Thus, estimating a GARCH model specification is suitable for modeling situations including clustering volatility, fat tails and persistence for daily spot and futures market returns.

Figure 1 displays the time-variations for daily spot markets returns. Figure 2 plots the time-variation for daily futures market returns.

Figure 1

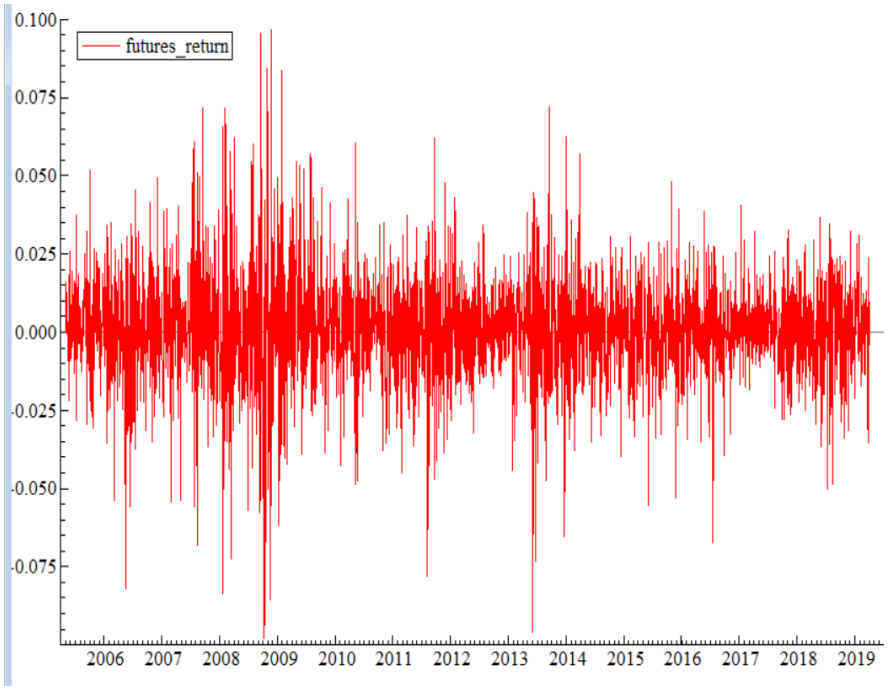
Time-Variations for Daily Spot Markets Returns



Source: Prepared by the authors

Figure 2

Time-Variations for Daily Futures Market Returns



Source: Prepared by the authors

In Table 2, the summary of test results for the DECO-FIAPARCH $(1, d, 1)$ model related to spot and futures returns are given. Panel A of Table 2 shows the results of FIAPARCH estimation for each return series. The fractional integrated coefficient (d) is significant for spot and futures returns implying volatility is strongly persistent. The long memory parameter "d" is higher in futures return series than in spot return series. In addition, $\lambda_{Assymmetry}$ term is positive and significant. It shows that compared to positive information, negative information shocks cause more volatility in the markets.

Table 2

DECO-FIAPARCH (1, d, 1) Test Results.

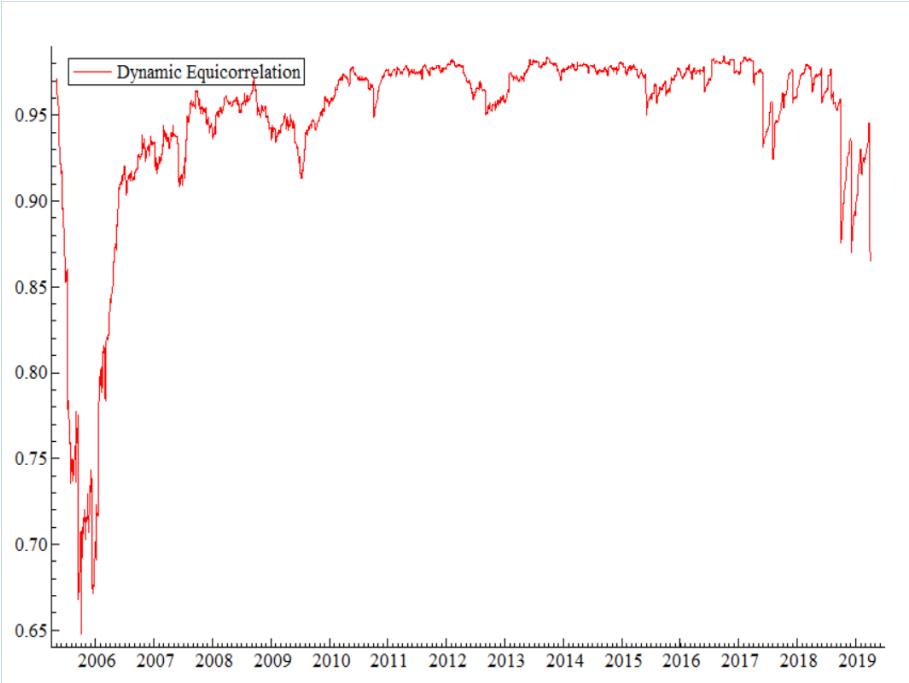
Panel A: Estimates of the univariate FIAPARCH model	**Spot Market Returns**	**Futures Market Returns**
Const. (m)	0.000609**	0.000723***
	(0.00025434)	(0.00025041)
Const. (v)	0.777214	1.250229
	(1.0104)	(2.1144)
d-Figarch	0.246559***	0.312659***
	(0.054628)	(0.072620)
$\emptyset_{\text{Arch(1)}}$	0.156081*	0.180324**
	(0.082281)	(0.080442)
$\beta_{\text{Garch(1)}}$	0.325997***	0.416435***
	(0.089125)	(0.11008)
$\lambda_{\text{Assymmetry}}$	0.420806***	0.336430***
	(0.13157)	(0.11659)
δ_{Power}	1.753216***	1.636502***
	(0.24188)	(0.33736)
Panel B: Results of the DECO model		
$\rho_{\text{\_DECO}}$	0.971277***	
	(0.0082268)	
$\alpha_{\text{\_DECO}}$	0.016598***	
	(0.0039900)	
$\beta_{\text{\_DECO}}$	0.979541***	
	(0.0057932)	
Panel C: Diagnostic tests		
Qs (10)	6.89118	8.26222
	[0.7356766]	[0.6032400]
Qs (20)	11.9256	11.6461
	[0.9186128]	[0.9277194]

***Note**: Qs (10) refers to the L-B test statistics conducted to the sqr. std. residuals with 10 lags, Qs (20) refers to the L-B test statistics conducted to the sqr. std. residuals with 20 lags. *, ** and *** shows significance level at the 10%, 5% and 1%, respectively. The std. errors are given with"()" and p-values are given with "[ ]".*

In Table 2, Panel B section summarizes the estimates for the DECO process. The a_{DECO} coefficient is significant at the 1% level and positive, emphasizing that shocks between the futures and spot markets are substantial. In the whole cases, the β_{DECO} parameter is

close to one and significant, verifying that volatility persistence is higher for spot and futures returns. Nevertheless, the dynamic equicorrelation is positive and close to one (0. 971277). This result indicates that hedging effectiveness is higher in the futures market than the spot market. In other words, futures market can hedge the risks in the spot market effectively. Given the diagnostic tests stated in Panel C in Table 2, considering the L-B test statistics for std. residuals and sqr. std. residuals, the null hypothesis which suggests no serial correlation is not rejected. This proves no indication of model misspecification.

Figure 3
Dynamic Equicorrelation for Spot and Futures Markets Returns



Source: Prepared by the authors

Figure 3 displays the dynamic equicorrelation for spot and futures markets returns as a group. It is clear from the figure that the correlations change in time throughout the sample period, implying that investors need to revise their positions in the futures market continuously for hedging the spot market risks.

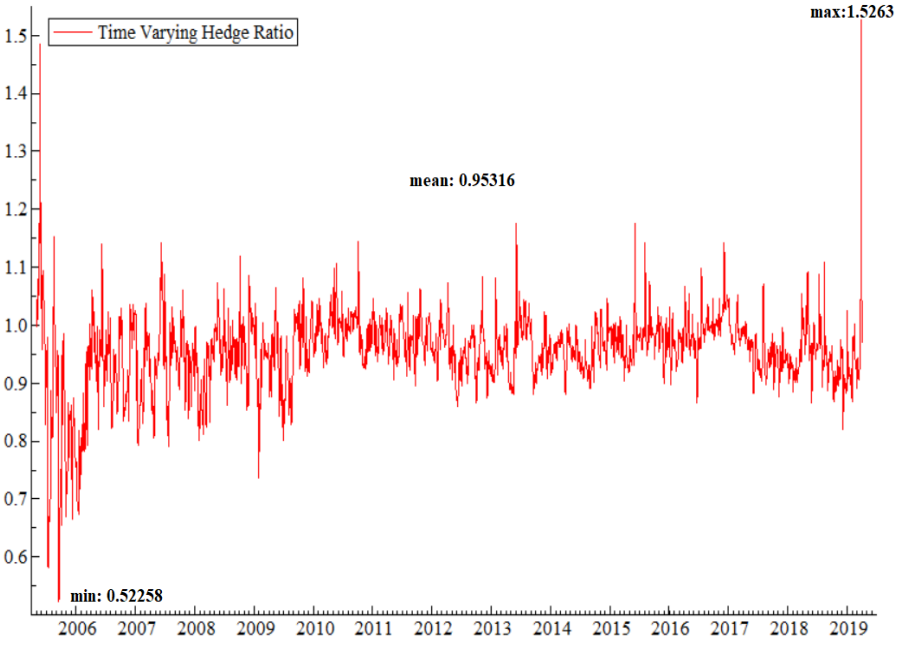
The aim of hedging is to minimize the risk of the price changes in the spot position with the usage of future contracts. The hedger should decide on the number of futures contracts to sell or buy for every unit of the spot asset. Referring to principles of the portfolio theory, Ederington (1979) and Figlewski (1984) define the problem of hedgers and calculate hedge ratios minimizing the variance of the portfolio. Optimal hedge ratio (HR) can be found by the following formula:

$$HR = \frac{Cov_{s\_f}}{Var_f}$$

where f is natural logarithms of futures and s stands for natural logarithms of spot prices.

Figure 4

Time-Varying Hedge Ratio



Source: Prepared by the authors

Figure 4 displays time-varying HR for the period selected. The mean value for the time-varying hedge ratio is 0.95316 which is

significantly close to 1. This result suggest that the investors should take almost one-to-one long or short position in the futures market for hedging the risks occurring in spot market. On average, a $1 long position in the spot market can be hedged for $0.95 by taking a short position in the futures market. Surely, it is an expensive hedging opportunity. Also, time-varying hedge ratio ranges between 0.52258 and 1.5263. Therefore, it is significant that investors should update their positions dynamically by considering the changing cross correlations in spot and futures markets.

5. Conclusions

The expanding interdependence of financial markets urges investors to undergo serious risk than ever before. Still, investors have an option for risk reduction related to price fluctuations occurred in the spot market. By hedging, in other words investing in the stock index futures and spot markets simultaneously, investors are able to decrease the risk. However, what is crucial is the calculation of the optimal hedge ratio. Although various models aim to determine optimal hedge ratio, dynamic models are generally shown to outperform the static models as they regard conditional heteroskedasticity. Dynamic models emphasize that it is more appropriate to adopt a time-varying hedge ratio instead of a single and static ratio.

When the extensive literature on the subject is examined, it can be seen that many different methods are used to measure the hedge performance of futures markets. (see Ederington (1979), Benninga et al. (1984), Myers, Thompson (1989), Ghosh (1993), Ghosh and Clayton (1996), Lien and Tse (1999), Yang (2001), Moosa (2003), Harris, Shen, (2003), Choudhry, (2003), Kenourgios et al. (2008), Lee et al. (2009).

On the other hand, in studies taking into account that the correlation between spot and futures markets changes over time, it is claimed that the hedge ratio estimations of dynamic models are more robust than the static models (see. Floros and Vougas (2004), Ai et al. (2007), Degiannakis and Floros (2010), Celik (2014), Gok (2016), Buberkoku, (2019), Lai (2019)).

Although most of the recent studies have estimated hedge ratios with bivariate GARCH models, none of these models consider long memory in volatility. Bivariate GARCH models, among the dynamic models, assume that information shocks have a short-term

effect on volatility. In this study, differing from the literature, the time-varying hedge ratio was calculated using fractional volatility models. This paper employs a new approach called DECO-FIAPARCH model in determining the optimal time-varying hedge ratio in Turkish Stock Index Futures market when asymmetry and long memory exist.

According to the research results, long memory (d) and leverage effect ($\lambda_{Assymmetr}$) have been determined in spot and futures ETFs. Negative information shocks exposed by both spot and futures markets cause more volatility in returns. In addition, information shocks that cause volatility are eliminated at a hyperbolic rate. On the multivariate GARCH analysis side, the conditional equicorrelation between the two ETFs is time-varying and approximately 97%. The persistence of the volatility spread between spot and futures ETFs is at 0.9795, indicating that it is highly persistent.

As a result of the calculations, the mean value of time-varying hedge ratios is found to be extremely close to 1 with a value of 0.95316. This mean value points out that people who want to invest in the Turkish spot market should take almost one-to-one buying or selling position in the futures market to be able to minimize the risk. Our results also demonstrate that time-varying hedge ratio changes between 0.52258 and 1.5263 for the sample period. So, it is critical for the investors to switch their positions actively by observing the fluctuant cross correlations in spot and futures markets.

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THE MICROPRUDENTIAL STRESS TESTING FOR BANKING SYSTEM. A STUDY CASE ON ALGERIAN PRIVATE BANK, USING ACCOUNTING APPROACH

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Abstract

The aim of this article is to highlight the importance and effectiveness of stress testing as part of microprudential policy. We focus on microprudential stress testing to assess financial stability, the resilience and solvency of one important private bank in Algeria in the face of liquidity risk. Our empirical analysis adopts a bottom-up approach based on an accounting method. It studies the relationship between the bank solvency ratio (ratio cook) and bank portfolios, such as loans to the construction, trade, industry, and automotive sectors. Microeconomic stress tests assess the credit risk of a bank's loan portfolio by bottom-up accounting approach, applying eleven pessimistic and plausible multi-variable scenarios with potential risks. The tests introduce several types of microeconomic shocks into the scenarios, which are designed to replicate those that occurred during the global financial crisis. The tests results show that this private bank is highly resistant to liquidity risk, despite significant losses on its investment portfolio. The stress tests prove once again, and especially after the 2008 financial crisis, that they are indispensable tools in the management of banking risks and against systemic risks.

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Keywords: microprudential policy; stress test; liquidity risk; solvency.

JEL Classification: G01; G21; G32

1. Introduction

The COVID-19 crisis shows the importance of the interaction between the financial system and the economic stability of countries. The COVID-19 crisis shows the importance of the interaction between the financial system and the economic stability of countries. Crisis affected the financial system and then spread through different transmission channels to all economies, especially the most fragile ones. The social damage, in the sense of economic development, unemployment, public deficit and debt, caused by the actual crisis is disaster. These results call for the overcoming of traditional methods that favor monitoring the financial soundness of individual institutions. This means strengthening banks' microprudential policy by analyzing the interactions with different economic sectors and their effects on financial stability in general. In this respect, stress tests represent a necessary lever for analyzing the relationship between microeconomic changes and the stability of the financial system (Olszak, & Kowalska, 2017).

The duration and severity of financial crises have led banks and supervisors to question whether stress tests are sufficient to predict or limit shocks, and whether they are adequate to integrate quickly with new shocks. Despite the fact that the crisis is far from being severe, according to the results published by the banks, it is possible to ignore the weakness of the stress tests in relation to the course of events on the part of the banks. As long as the crisis has not yet emerged, banks and monetary authorities must learn lessons. Stress tests have become an indispensable tool in the management of banking risks (Kapinos & Mitnik, 2016). They were developed gradually after the systemic financial crisis of 2008 that affected the banking sector (Abdymomunov & Curti, 2020).

The purpose of the Basel Accords is to require banking institutions to balance their balance sheets in a certain way. The ratio to be applied, called the McDonough ratio (formerly the Cooke ratio), is not immediately legally binding but is drafted by the regulators in internal regulations. Several devices and a body of law to assess and identify banking risks were implemented. Two main ratios represent the

axis of banking regulation: liquidity and solvency ratio. However, prudential regulation serves to prevent a bank failure, as this will have negative repercussions on the economic and financial sphere in general. Thus, the Basel Accords aim to reform the system of bank resilience to economic shocks and turmoil. A sound banking system is the cornerstone of monetary and financial stability that leads to macroeconomic stability. (Bank for International Settlements, 2005)

The new requirement of the Basel agreements, called the McDonough ratio, does not change the logic of the basic agreement but enriches it. To indicate this ratio is expressed indistinctly as solvency ratio or capital adequacy. The mechanism of agreement, called Basel II, lasted for many years and caused much ink to flow in the specialized press.

In Algeria, stress tests are far from performing well due to several reasons. A weak banking data infrastructure limits the optimal application of stress tests. Hence, insufficient training of banking staff to master the tools for analysis and application of stress tests. That is why, Algerian monetary supervisors should continue to progress in the area of risk management, applying various mechanisms (Bouchetara, 2018).

In this article, we focus on microprudential stress testing to assess financial stability in a private Algerian bank, and address two natural issues. First, how to measure credit risk in commercial bank? Second, how to measure a bank's fragility in the face of credit risk? To answer these questions, we develop a framework for microeconomic stress testing of credit exposures in a private investment bank. Our empirical analysis adopts a bottom-up approach based on an accounting method. It studies the relationship between the bank solvency ratio (ratio cook) and bank portfolios, such as loans to the construction, trade, industry and automotive sectors. Microeconomic stress tests assess the credit risk of a bank's loan portfolios by applying pessimistic and plausible multi-variable scenarios with potential risks. The tests introduce different types of microeconomic shocks into the scenarios, which are designed to replicate those that occurred during the financial crises of 2008.

2. Literature review

In the face of the COVID-19 health crisis, microprudential policy is an effective tool. From 1990 onwards, the supervisory authorities

have surrounded themselves with a corpus of preventive models similar to the stress tests (Andrieş, Nistor, & Sprincean, 2020). Several approaches are used to limit the rise in systemic risk (Angora & Tarazi, 2011). In the experience of the Asian crisis of 1997 and the recent crises in Latin America and advanced countries, these approaches have revealed many limitations, which can be summarized in two important points. First, the majority of these approaches are based on a notion of the banking crisis that is not unanimous and therefore raises the issue of the timing of the outbreak or detection of the crisis. Second, the history of banking crises suggests that a multiplicity of causes is at the root of banking panics. However, the majority of these stress test approaches rely on macroeconomic, macro-monetary and financial parameters and neglect a few variables that are typical for banks.

The objective of microprudential policy is to protect individual financial institutions against risks and prevent them from taking too much risk (Osiński, Seal, & Hoogduin, 2013). However, the recent financial crisis in 2008 showed that the stability of individual financial institutions is not sufficient to ensure the stability of the financial system as a whole. Microprudential policy instruments involve, at a minimum a set of quantitative risk-based instruments, to establish capital and liquidity requests for individual institutions, effective supervisory powers over institutions (e.g., licensing, governance, risk management, sanctions, and powers to take remedial action). Internal control units are obliged to assist in the monitoring of all risks incurred by the institution. This activity is crucial because it targets major issues, such as the fight against money laundering or the illegal allocation of funds. The principle of creating a typical business is in line with the recommendations of the 2003 Basel Committee on the compliance function, which ranked eleven principles (BIS, 2003).

The duration and severity of financial crises have led banks and supervisors to ask the question whether stress tests are sufficient to predict or limit shocks, and whether they are adequate to integrate quickly with new catastrophic situations. Despite the fact that the crisis is far from being severe, according to the results published by banks, it is possible to ignore the weakness of stress tests with respect to the course of events on the part of banks. Although the crisis has not yet emerged, there are lessons to be learned by banks and monetary authorities. Stress tests have become an indispensable tool in the management of banking risks. They were developed progressively after the systemic financial crisis of 2007 that affected the banking

sector. Pillar II of the banking requirements was reinforced by the stress test tool not only at the US and European level but at the global level.

Stress tests aim to measure the temporary impact of severe and pessimistic, but rather plausible, scenarios on financial stability in general and banking stability in particular. The scenarios are based on shocks and micro-macroeconomic simulations. Typically, a standard stress test for banks has a time horizon of two to five years to be implemented (Martin, Tavolaro & Viol, 2013)

Several financial institutions in the United States and Europe have introduced rigorous stress testing programs since 2009, as required by supervisors.

2.1. SCAP: Supervisory Capital Assessment Program

The first stress test initiative was the Supervisory Capital Assessment Program (SCAP), launched during the severe crisis of April 2009. The SCAP had two key objectives:

- To identify institutions vulnerable to continued downside under macroeconomic conditions.
- Detect systemic risks to the financial system and financial markets.

The 19 banks required to perform the SCAP test included U.S. banks with assets in excess of $100 billion. This group, at the time managing 66% of the U.S. banking asset system and 50% of its loans, was asked to define losses and revenues during the 2009-2010 period under two scenarios (Rebonato, 2010):

- Base case: reflecting economists' forecasts as of February 2009.
- Worse or very pessimistic scenario: simulating a deeper and lasting recession.

Despite the results affirming the basic stability and soundness of the largest financial institutions, the SCAP tests showed serious flaws in the stress test industry's capabilities, efficiencies and processes. This was not surprising since many institutions had little experience, because most managers were concerned about the financial crisis. The SCAP program did not meet these two objectives: identifying vulnerable institutions and detecting systemic risks. The initiative also provided valuable information for regional banks that

were building a stress test program. In addition, the results published by SCAP enhanced market stability by providing evidence that the capital position of several institutions was being monitored, and the likelihood of a structural systemic shock was decreasing.

SCAP provided considerable insight to the Fed into the particular vulnerability of America's largest financial institutions. Renewed investor confidence provided the 19 bank holding companies with an increase of more than $300 billion in common stock from the fourth quarter of 2008 through the end of 2010. The increase in investor confidence coincided with improvements in the balance sheet strength of the 19 institutions, with the average common weighted Tier 1 ratio increasing from 5.4% in the fourth quarter of 2008 to 9.4% in the fourth quarter of 2010.

2.2. CCAR: Comprehensive Capital Adequacy Review

In February 2011, the affected banks were required to pass a second test: Comprehensive Capital Adequacy Review (CCAR). For this initiative, the FED had the top banks that passed the stress tests around new scenarios. These tests represented a significant departure from SCAP in terms of the depth and breadth of the objectives, as well as the robustness of the scenarios and the seriousness of their implications. The 19 U.S. banks were asked to develop and implement capital plans in response to the continued deterioration of the economy. The results of CCAR would help determine whether an institution should be allowed to release capital in the form of increased dividends to shareholders. These institutions were then asked to submit detailed plans across five aspects (FSR, 2015):

- Capital assessment and planning processes.
- Capital distribution policy.
- Plans for repayment of any state investments.
- Plans to address the expected impact of Basel III and Dodd-Frank.

Three scenarios were simulated in the projected tests of bank earnings, losses, and capital position over a nine-quarter period, beginning in the fourth quarter of 2010 and ending in the fourth quarter of 2012 (FSR, 2013):

- Base case: a replication using current economic projections.

- Stress scenario: assessing each bank-specific vulnerability, the scenarios are generated by the bank with input from the FED.
- Supervisory Stress Scenario: a perspective scenario generated by the FED to assess the ongoing impact, unemployment, sharp decline in GDP and real estate.

The main results of this stress scenario analysis were new quarterly regulatory capital projections for each bank – the Tier 1 capital ratio, the capital and leverage ratio, the total ratio, as well as a basic Tier 1 ratio similar to that used in the SCAP.

2.3. European Banking Authority Testing

The European Banking Authority (EBA) Testing was similar to the SCAP and CCAR tests in its rigor and discipline. The objective of EBA was to test the resilience of an adverse but plausible scenario. The benchmark is that banks must have at least 5% of risk-weighted assets as Core Tier 1 capital. The simulation covered from 2010 until 2012, publishing the results in July 2011. The banks made provisions for losses of $ 200 billion for two years (the test period). The first results showed that 20 banks, out of 90 banks, fell below the 5% threshold. However, the EBA asked the banks to make efforts to increase their capital during the first months of 2011 to reach the adequate capital. Only 8 banks did not pass these tests. The stress test scenario cannot be the same for all banks because of the specificities of their activities, for example: interest rate, exchange rate. Banks aim to deal with solvency risks (credit risk, market risk, sovereign risk) and to deal with contagion tragedies.

In 2011, EBA published recommendations for stress tests (EBA, 2011). These recommendations show the sophisticated evolution of stress tests. BIS further confirmed that:

- Stress tests cannot be a model-driven on-off exercise (The Driven on-off is a software that makes the automatic programming of models).
- The tests produce applicable results.
- The results found are used in risk management.
- Supervisory authorities are active participants.

Recommendations are:

- Banks develop a stress test program that promotes identification and control, provides complementary perspectives for other risk

management methods, improves capital and liquidity management, strengthens internal and external communication.

- The stress test considers the management forms of the entire organization.
- The importance of the flexibility of the banking infrastructure to accommodate the various possible changes of the stress test program.
- The bank should maintain and update the structure of its stress tests.
- Stress tests should cover different risks.
- Stress tests cover different scenarios, including forward-looking scenarios, and take into account system-wide interactions and feedback effects.
- Stress tests are characterized by severity, including events capable of generating the most damage and loss whether through share value or reputational damage.
- The stress test program must also determine the scenario that can challenge the viability of banks and discover the hidden risks and interactions between risks.
- In partial application of the stress test program, the bank should consider the simultaneous pressures on funding and asset markets, and the impact of reduced market liquidity.
- The effectiveness of risk mitigation techniques should be systematically challenged.
- The stress test program should explicitly cover complex and customized products such as securitized exposures.
- The bank should improve the stress test methodology to accurately the effects of reputational risk. The bank should incorporate risks arising from off-balance sheet vehicles[1] and other related entities into its stress test program.
- The bank should improve its stress testing approaches for highly leveraged counterparties when considering its vulnerability to specific asset classes or market movements and assessing the potential risk of misdirection of risk mitigation techniques.

[1] *Off-balance sheet banking vehicles (financed at less than one year) were exempted from the solvency ratio when they were not the subject of a line of credit granted by the bank that set up the vehicle. However, many banks had to support these structures, which involved their reputation.*

2.4. The performance of stress tests during crises

The last financial crisis of 2008 showed the weaknesses of the stress tests used, for that, it would be necessary to know the key elements of the resistance tests (BIS, 2009):

- The usefulness of stress tests.
- The methodology of stress tests.
- The selection of scenarios.
- Stress testing for specific risks and products.

The usefulness of stress tests

Those responsible for managing and applying stress tests have been criticized for their use of bank stress tests in terms of governance and capital. The parameters of stress tests encompass the following objectives:

- The identification of scenarios.
- Analysis of stress test results.
- Evaluation of the decisions taken.

The banks that were exposed to the financial crisis of 2008 managed to hold, thanks to the managers who successively succeeded in the development and management of stress tests, with the results obtained serving as input to the banks' strategies. However, the application of stress tests at the level of all banks did not promote internal debates or challenge previous assumptions such as costs, risks and the speed with which capital can be increased. The financial crisis of 2008 also showed the weakness of organizational stress testing programs. Prior to the 2008 financial crisis, risk management departments with market interaction applied stress tests separately.

This meant, among other things, that market participants often thought that the analyses and results were not credible. The stress tests were only routine technical exercises. As long as there is a department that operated the stress tests with routine and without understanding the stress test program, it does not allow showing the accurate picture because of the mechanical approach that cannot take into account the changing business market conditions nor incorporate qualitative solutions. Prior to the 2008 financial crisis, many banks did not have a comprehensive stress test program in place but managed stress tests separately for specific risks or portfolios with limited

integration of businesses. While market and interest rate stress tests had been applied for several years. In contrast, the application of banking stress tests in the literature has recently been achieved. Other styles of stress tests are not yet developed. Stress tests were not able to act flexibly and quickly when crises occur. New investments in IT infrastructure may be needed to improve the availability and granularity of risk information that enables rapid analysis of the impact of new stress scenarios designed to respond to a rapidly changing environment.

The methodology of the stress tests

A varied complexity, starting with simple to more complex stress tests. The goal is to assess and determine the severe impact of macroeconomic shocks by measuring, for example, earnings and capital. Stress tests are performed on several levels of aggregation, starting with the level of an individual instrument at the institutional level. Stress tests are effective for many types of risk such as market, credit, operational and liquidity risk. Despite the existence of several methodological types of application, the financial crisis of 2008 highlighted the weakness of these instruments.

Specifically, the weakness of the infrastructure limited the ability of banks to identify the risks involved. These weaknesses limit the effectiveness of risk management tools - including stress tests. Most risk management methods, including stress tests, use statistics and recent data to assess risk. They assume that a known and constant statistical process drives risk, i.e., they assume that historical relationships provide a good basis for predicting future risk. The crisis has shown their shortcomings in relying on such an approach.

First, having a long period of stability is linked to prior information that favors conditions, so the models could not detect shocks or the accumulation of vulnerabilities in the system. Historical statistical relationships, such as correlations, proved to be reliable once the actual events began to unfold.

Second, the 2008 financial crisis also showed us that, under conditions of stress and panic, risk characteristics can change rapidly as can the reactions of market participants in a system that is sensitive. These effects can dramatically amplify shocks like the last financial crisis of 2008. Extreme reactions as defined above occur rarely and can carry an extra charge for the model that is linked with historical data. In other words, they have a weight on the model quantitatively.

The managers of most banks have neglected this issue of risk management model, the most traditionally used seriously, to derive the results of stress tests.

Furthermore, they did not take into consideration the qualitative advice of experts in developing scenario innovations. As a result, banks in general have underestimated the close links between lack of market liquidity and pressure to find funding or liquidity. Reliance on data relationships and ignorance of reactions in the system is generally due to banks underestimating the interaction between risks and the impact of a severe scenario. Prior to the 2008 financial crisis, most banks had not properly applied stress tests according to the advisors' perspectives. Even so, the stress tests were insufficient to detect risks. As a result, banks did not have a clear view of the credit, market and liquidity risks to their operations.

Scenario selection

One of the main challenges facing most supervisors and banks in designating a stressed scenario is consistency. Scenarios have several factors, seeking to develop rich descriptions of undesirable situations in the world from a severe risk factor and taking into account this is not enough to identify only high unemployment, increased credit speculation or a sudden and unexpected drop in prices. This is not enough to identify only high unemployment, increased credit losses or an unexpectedly sharp drop in prices. When one factor changes, the other factors do not remain fixed. Difficulties arise in determining common outcomes for all risk factors. Now, not all exchange rates depreciate at once, some appreciate. In 2009, SCAP had a simple scenario specification. The states had only three dimensions (GDP growth, unemployment, real estate price indices), the market risk scenarios were based only on historical experiences.

For the year 2011, the EBA test supervisors identified about 70 portfolio risk factors, 08 macroeconomic factors for 21 countries (macro factors such as GDP growth, inflation, unemployment, real estate price indices, and stock prices). ECB economists generated the macroeconomic stress test scenarios. Most bank stress tests were not previously designed to capture and detect extreme market events. Most firms found that one or more severe aspects of the stress tests did not reach considerable development. Prior to the crisis, severe and severe stress scenarios estimated losses of no more than a quarter of earnings. History has shown that when stress events occur, banks

easily lose more than a quarter of earnings. Several techniques have been used to develop the scenarios. In general, there are sensitive tests at the base, which influence only one parameter, leaving other factors constant. Since the scenarios ignore several risk factors or feedback effects, their main purpose is to provide a quick initial assessment of the portfolio sensitive to a given risk factor and to identify risk concentrations.

Other more sophisticated approaches apply shocks to several parameters simultaneously. The approaches are generally historically based or hypothetical. The historical scenarios implemented are often based on significant market events in the past, such as stress tests that were unable to capture the risks of new products in the midst of a crisis. In addition, the high level and duration of stresses indicated by previous episodes have proven inadequate. The long period of stress tests is observed without difficulty and the historical stress tests underestimated the level of risk and the interaction between risks. Banks also apply hypothetical stress tests, based on pessimistic scenarios that manage to capture events that could be adversely affected. However, prior to the 2008 financial crisis, banks in general applied only modest scenarios, in terms of severity, degree of portfolio interaction, or types of risks. In many banks, it is difficult for risk managers to get the right methodology to build severe scenarios. Risk managers often treated these scenarios, which are considered severe or novel, in an implausible way.

To now, all stress tests have imposed a single scenario for all banks. Of course, any scenario can be difficult for some banks and easy for others, depending on their location and activities. This one-size-fits-all approach is analogous to both the regulatory problem and the internal capital business models. Between 2011 and 2012, CCAR recognized this problem and asked banks to publish their results using their scenarios (base and stressed scenario) in addition to the common stress test supervisor results. This was an important step prior to the start of 2009 SCAP: asking banks to develop their scenarios, which they used to show vulnerabilities, portfolio sensitivities and banking activities. Supervisors can learn from banks about high-risk scenarios. This is used not only for microprudential supervision, also for macroprudential supervision, by allowing the possibility of learning common risks across previously undiscovered banks.

Special risks

The scenarios were not severe enough to stress test structured products and leveraged loans before the crisis. This means that at some level they were dependent on historical data. In general, stress tests for structured products suffered from the same problems as other risk management models. These differences were exposed during the 2008 financial crisis and degraded the effectiveness and performance of stress tests. Furthermore, the stress tests also assumed that the markets for structured products would remain liquid, or, if the market for liquidity were weak, that it would not remain so for long. Therefore, banks underestimated the securitization risks associated with the new structured products.

The banks' reaction to the failure of the scenarios could have negative repercussions. This is related to the risk of notoriety or reputation, as well as idiosyncratic risk. The collective reaction of banks could lead to broader disruptive effects on financial markets (systemic risk). In many cases, stress tests treated only one-way risk, forgetting to detect the main causes of the risks, which reduced the effectiveness of the hedges. The other specificity of the crises was the risk of misdirection or misdirection, which could be linked to the credits purchased by the insurance companies. Another weakness of these models was the inability to capture the possible risks that arose on a regular basis, from the legally binding credit and liquidity lines or by reputation.

Applications of stress tests after the 2008 financial crisis

After the shocks suffered by the crises, the stress tests have obtained great importance and credibility in the banks as a risk management tool to determine the different risks. It is important that this process continue in this way, the stress test programs become part of the governance structures. These processes still need to be suggested by risk managers. Banks recognize that the current stress test plan should be strengthened with respect to the terms and types of risks. A few banks have already begun to improve this plan. Other weaknesses of the specific risk stress tests were identified after their implementation. In general, the points of improvement of the banks are:

- Improvement and invention of scenarios.
- Reviewing new products to identify potential risks.
- Assessing the adequacy of time and impact responses.

- Reforming the identifications and aggregations of correlated risks through guides such as interactions between markets, credits and liquidity risks.

In general, stress tests are still being planned and improved at several banks to allow for the identification of appropriate risks and their effective aggregation.

3. Data and method framework

3.1. Data

In order to stress the selected variables, we used the following data:

- Prudential statements, (Bank of Algeria, 2020)
- The elements used to calculate a bank's assets (current claims, classified claims, other assets) and off-balance sheet items;
- The elements used to calculate weighted risks (for credit risk and operational risk).
- The reporting of provisions for classified receivables, (Bank of Algeria, 2020)

The breakdown of commitments by:

- Type of client (corporate, professional, individual);
- Business sectors;
- Credit ratings;
- The breakdown of watch list commitments.
- The breakdown of provisions for classified receivables.

3.2. Method

In this paper, we apply a microprudential stress testing as bottom-up approach. This will be carried out on the Algerian private bank only and will be based on the specificities of the bank without taking into account the characteristics of other banks (BIS, 2017). As regards the method to be used, we have chosen to carry out the stress test by sensitivity analysis, because it is the efficient method to carry out, because other methods require models that link macroeconomic variables to financial variables (IMF-BIS-FSB, 2009).

3.2.1. Scenario building and definition of shocks

Before building the scenarios, we analyze the portfolio of the bank's liabilities that we stress because the determination of shocks is based on its characteristics. Our commitment portfolio is made up of 42% off-balance sheet loans and 48% on-balance sheet loans, mainly to companies. Off-balance sheet assets comprise 47% documentary credits and medium-term credits have the highest percentage on the balance sheet.

As far as the most dominant sectors of activity in the portfolio are concerned, we distinguish five: construction (15.1%), automobile distribution (14%), pharmaceuticals (14.3%), trading (11%) and the food industry (7.5%). This portfolio of commitments is well diversified and does not show any concentration on any particular sector or product.

As we do not have historical data (crises that have already occurred), we create scenarios of crises that may occur in the future to carry out our sensitivity tests (Cihák, 2007). We create eleven scenarios. In each scenario, there will be one shock or several shocks at the same time. Indeed, we will start stress testing a single variable, and then we will add other variables to it.

With regard to the intensity of the shocks, we apply different degrees of severity to determine the sensitivity of the institution to them. In view of the characteristics of the external environment and through the analysis of the bank's internal situation, we have chosen to carry out the following scenarios:

- Deterioration of current claims.
- Deterioration of current claims and downgrading of classified claims (with different intensities).
- Deterioration of claims held on the construction sector.
- Deterioration of claims held on the automotive sector.
- Simultaneous deterioration of claims held on the construction and automotive sectors.
- Downgrading of the Watch List claims.
- Simultaneous downgrading of doubtful loans and Watch List loans.
- Downgrading of credit ratings.

Before applying on to the application of shocks to the selected variables, first we present the initial situation. The figures recorded for

the initial situation are as follows: (the figures are in thousand Algerian dinars).

Table 1

The initial situation

- Algerian dinars -

Net income for the last financial year	1.985.717
Regulatory capital	16.683.590
Risk Weighted Assets RWA	144.953.023
Capital Adequacy Ratio CAR (%)	11,51%

Source: authors

As far as commitments are concerned, we have the following data at our disposal:

Table 2

Commitments data

- Algerian dinars -

Type of receivables	Amount
Current receivables	158.657.111
Receivables in category	2.976
Potentially problematic receivables (CAT 1)	286.031
High-risk receivables (CAT 2)	1.742.214
Impaired receivables (CAT 3)	3.432.612
Watch List receivables	16.590.000
Receivables from the construction sector	23.975.500
Receivables from the automotive sector	22.373.400

Source: authors

The above figures show that the bank is achieving a profitable result and that it is managing its risks well. In fact, the classified debts represent only 3% of the total commitments and the solvency ratio is well controlled, with a percentage of 11,51% exceeding the regulatory limit set at 9,5%. the bank is solvent and that it has no difficulty in managing its portfolio of commitments.

3.2.2. Conduct of the stress test exercise

Our stress test exercise consists of calculating the corresponding solvency ratio for each scenario. We assume that the denominator of the ratio remains unchanged in all scenarios, and we analyze the impact of shocks on the numerator only.

Indeed, the deterioration in the quality of the claims affects the shareholders' equity because it generates an increase in the provisions

for classified claims and therefore in expenses, which will reduce the result and consequently the shareholders' equity.

It should be noted that the expenses for general banking risks that are part of the additional capital will also be assumed to remain unchanged because their variation is not very significant and because through these tests, we want to analyse the simple fact of a change in the provisions for classified receivables.

From another point of view, the upheaval in the economic environment caused by a crisis would also affect the entity's activity, which would see a decrease in income and, as a result, would record a lower result and show a decrease in its equity.

The downgrades that we are going to carry out on the latter require additional provisions in order to meet the regulatory requirements relating to the provisioning of classified receivables (Bank of Algeria; Regulation 14-03, Article 10, 2014).

Provisions must be made for new classified receivables and additional provisions must be made for receivables that are already in this category and that have been downgraded to an inferior quality. The provisioning of loans constitutes a cost of risk borne by the bank, and is equal to the sum of allocations to provisions less the sum of write-backs of provisions.

$$Cost\ of\ risk = \sum (allocations\ to\ provisions - reversals\ of\ provisions)$$

In order to make the shocks more severe, we have considered that there is no reversal of provisions, in which case the cost of risk becomes equal to the provision allocations. A bank's claims are subdivided into two categories, current claims and classified claims, which in turn are further, subdivided into three subcategories, potential problem claims, high-risk claims and impaired claims.

The provisions are according to Article 11 of Regulation 14-03 of the Bank of Algeria, relating to the classification and provisioning of claims and commitments by signature of banks and financial institutions, made on the basis of "the gross amount excluding unrecovered interest and after deduction of admitted guarantees".

In order to make the shocks more severe, we assumed that there was no eligible collateral for the receivables to be provisioned. Our basis for calculating provisions is therefore gross excluding interest recovered.

The provisions are according to Article 11 of Regulation 14-03 of the Bank of Algeria, relating to the classification and provisioning of claims and commitments by signature of banks and financial institutions, made because of the gross amount excluding unrecovered interest and after deduction of admitted guarantees.

In order to make the shocks more severe, we assumed that there was no eligible collateral for the receivables to be provisioned. Our basis for calculating provisions is therefore gross excluding interest recovered.

- Claims with potential problems (CAT1) 20%
- High-risk receivables (CAT2) 50%
- Impaired receivables (CAT3) 100%

4. Application and results

The further deterioration of the result in some scenarios is assumed to be due to a low level of the bank's income because of the COVID-19 crisis. Indeed, we analyse the double impact of a crisis: a decrease in income and an increase in expenses at the same time.

4.1. Scenario one: Deterioration of current receivables

We assumed a 5% deterioration in the portfolio's current receivables. Then, and in order to accentuate the effect of this action, we imagined the possibility of a 5% decrease in the bank's result compared to the previous year. The results obtained by carrying out this test are as follows:

The constitution of the classified debts and their provisioning

Table 3

Results after scenario 1 on classified claims

- Algerian dinars -

Categories	NPL before the shock	Provisions before the shock	NPL after the shock	Loss provision	Provisions after the shock
Category 1	286.031	73.312	8.218.886	1.586.571	1.659.883
Category 2	1.742.214	821.160	1.742.214	0	821.160
Category 3	3.432.612	3.255.366	3.432.612	0	3.255.366
Total	5.460.856	4.149.838	13.393.712	1.586.571	5.736.409

Source: authors

$$Provisions\ after\ shock = provisions\ before\ shock + allocation\ to\ provisions$$

$$Provisions\ after\ shock = doubtful\ loans\ after\ shock * provisioning\ rate$$

Capital and solvency ratio after the shock

Table 4

Results after scenario 1 on the solvency ratio

- Algerian dinars -

	Before shock	After shock
Capital requirement	16.683.590	15.097.019
RWA	144.953.023	144.953.023
CAR (%)	11,51%	10,42%

Source: authors

$$Equity\ after\ shock = equity\ before\ shock - allocation\ to\ provisions$$

By exerting additional stress by reducing the bank's earnings, we obtain:

Table 5

Results after scenario 1 with a decrease in the result

- Algerian dinars -

	Before shock	After shock
Bank result	1.985.717	1.886.431
Capital requirement	16.683.590	14.997.733
RWA	144.953.023	144.953.023
CAR (%)	11,51%	10,35%

Source: authors

We note that after the exercise of this first scenario, the solvency ratio is still above the regulatory limit of 9,5%, even though it has fallen from 11.5% to 10,42%. The impact on the bank's financial strength is therefore not significant and this stress would not put the bank at risk even if it achieves a lower result.

4.2. Scenario two: Deterioration of current and classified receivables

For this second scenario, we have chosen the following assumptions.

- Deterioration of 5% of current receivables and receivables from category 0 to category 1 of classified receivables.
- Downgrading of classified receivables:
  a. Receivables in category 1 are in category 2.
  b. Category 2 receivables are included in category 3.

As with the first shock, we will also analyse the additional effect of a 5% deterioration in the bank's current earnings. The results are as follows:

The constitution of classified claims and their provisioning

Table 6

Results after scenario 2 on classified claims

- Algerian dinars -

Categories	NPL before the shock	Provisions before the shock	NPL after the shock	Loss provision	Provisions after the shock
Category 1	286.031	73.312	7.935.832	1.587.166	1.587.166
Category 2	1.742.214	821.160	286.031	106.359	927.520
Category 3	3 432 612	3.255.366	5.174.826	921.054	4.176.420
Total	5.460.856	4.149.838	13.396.688	2.614.579	6.691.106

Source: authors

$$Allocation\ to\ provisions\ of\ category\ 1 = (5\%\ of\ current\ claims\ before\ shock + claims\ of\ category\ 0) * 20\%$$

$$Allocation\ to\ category\ 2\ provisions = (category\ 1\ claims - category\ 1\ provisions\ before\ shock) * 50\%$$

$$Allocation\ to\ category\ 3\ provisions = (claims\ in\ category\ 2 - provisions\ in\ category\ 2\ before\ shock) * 100\%$$

$$Provisions\ after\ shock = receivables\ after\ shock * provisioning\ rate$$

The changes in shareholders' equity and the solvency ratio are as follows

Table 7

Results after scenario 2 on the solvency ratio

- Algerian dinars -

	Before shock	After shock
Capital requirement	16.683.590	14.069.011
RWA	144.953.023	144.953.023
CAR (%)	11,51%	9,71%

Source: authors

After adding a further deterioration of the result, we obtain:

Table 8

Results after scenario 2 with a drop in the result

- Algerian dinars -

	Before shock	After shock
Bank result	1.985.717	1.886.431
Capital requirement	16.683.590	13.969.725
RWA	144.953.023	144.953.023
CAR (%)	11,51%	9,64%

Source: authors

We note that the exercise of this shock, like that of the first one, has no influence on the bank's financial health and solvency because the solvency ratio remains always higher than the 9.5% imposed by the regulator, even if it has fallen close to this limit.

4.3. Scenario three: Deterioration of claims in the building and public works sector

The construction sector is the main sector making up the bank's loan portfolio. A crisis affecting this sector would, therefore, seriously undermine the financial health of the institution.

In order to know the impact of such an incident, we have assumed the deterioration of 50% of the claims held on this sector and the results we have obtained are summarized in the following tables:

The constitution of claims and their provisioning

Table 9

Results after scenario 3 on classified claims

- Algerian dinars -

Categories	NPL before the shock	Provisions before the shock	NPL after the shock	Loss provision	Provisions after the shock
Category 1	286.031	73.312	12.271.781	2.397.150	2.470.462
Category 2	1.742.214	821.160	1.742.214	0	821.160
Category 3	3.432.612	3.255.366	3.432.612	0	3.255.366
Total	5.460.856	4.149.838	17.446.606	2.397.150	6.546.988

Source: authors

$$Allocation\ to\ provisions = 50\%\ of\ claims\ in\ the\ automotive\ sector * 20\%$$

The constitution of equity capital and the solvency ratio

Table 10

Results after scenario 3 on classified claims

- Algerian dinars -

	Before shock	After shock
Capital requirement	16.683.590	14.286.440
RWA	144.953.023	144.953.023
CAR (%)	11,51%	9,86%

Source: authors

4.4. Scenario four: Deterioration of claims in the automotive sector

The automotive sector is the second largest sector in the liability portfolio, and like the construction sector, it is exposed to changes that could affect the bank's financial strength. Indeed, 2015 was a year full of changes for this sector in Algeria and these changes may not stop. As a result, we have realized this scenario, which consists in downgrading 50% of the claims of this sector. The results obtained with this exercise are the following.

The constitution of the classified debts and their provisioning

Table 11

Results after scenario 4 on classified claims

- Algerian dinars -

Categories	NPL before the shock	Provisions before the shock	NPL after the shock	Loss provision	Provisions after the shock
Category 1	286.031	73.312	11.472.731	2.237.340	2.310.652
Category 2	1.742.214	821.160	1.742.214	0	821.160
Category 3	3.432.612	3.255.366	3.432.612	0	3.255.366
Total	5.460.856	4.149.838	16.647.556	2.237.340	6.387.178

Source: authors

The constitution of equity capital and the solvency ratio

Table 12

Results after scenario 4 on the solvency ratio

- Algerian dinars -

	Before shock	After shock
Capital requirement	16.683.590	14.446.250
RWA	144.953.023	144.953.023
CAR (%)	11,51%	9,97%

Source: authors

The results of Scenarios 3 and 4 gave solvency ratios above the regulatory limit. We can then conclude that a crisis of moderate intensity affecting only one of the main sectors financed by the bank would not cause solvency problems for the bank.

4.5. Scenario five: Deterioration of claims in the construction and automotive sectors at the same time

The purpose of this test is to show the impact of a simultaneous degradation of both the construction and automotive sectors. It is based on the downgrading of 50% of the receivables of each sector and thus combines the two previous scenarios. The results we obtained are as follows:

The constitution of classified receivables and their provisioning

Table 13

Results after scenario 5 on classified claims

- Algerian dinars -

Categories	NPL before the shock	Provisions before the shock	NPL after the shock	Loss provision	Provisions after the shock
Category 1	286.031	73.312	23.458.481	4.634.490	4.707.802
Category 2	1.742.214	821.160	1.742.214	0	821.160
Category 3	3.432.612	3.255.366	3.432.612	0	3.255.366

Source: authors

$$Allocation\ to\ provisions = claims\ in\ category\ 1\ after\ shock * 20\% * 20\%$$

Building up equity capital and the solvency ratio after the shock

Table 14

Solvency ratio results after scenario 5

- Algerian dinars -

	Before shock	After shock
Capital requirement	16.683.590	12.049.100
RWA	144.953.023	144.953.023
CAR (%)	11,51%	8,31%

Source: authors

The simultaneous stress of the two main sectors financed by the bank has just shown the vulnerability of the bank to such a shock. Indeed, the solvency ratio recorded is 8.31%, which is below the limit set by the regulator.

This scenario is already quite violent, but we will intensify it even more with the assumption of a 5% drop in the bank's result compared to its current amount, because such a shock would not be without impact on the bank's income.

The effects observed by this exercise are summarized in the following table:

Table 15

Results after scenario 5 with a drop in the result

- Algerian dinars -

	Before shock	After shock
Bank results	1.985.717	1.886.431
Capital requirement	16.683.590	11.949.814
RWA	144.953.023	144.953.023
CAR (%)	11,51%	8,24%

Source: authors

With a further drop in the bank's result in times of crisis, the solvency coefficient would deteriorate even further causing more damage. This type of crisis may occur in the near future due to economic and regulatory changes in these two sectors of activity. The bank must then take the necessary measures to avoid this situation.

4.6. Scenario six: Downgrading of Watch List receivables

Watch list is a list held by the bank, on which a certain number of customers presenting irregularities or having shown difficulties in repaying their credits. It is considered as tool for monitoring and managing customers in difficulty. Indeed, the customers on this list are subject to special monitoring and treatment to enable the situation to be regulated and with the aim of minimizing the risk borne by this category of customers. Watch List clients are therefore clients to be monitored very closely, their situations are critical, they are therefore very exposed to risk, and they are the first to be affected in times of crisis. This is where we build this scenario, which consists of downgrading all the receivables in this category.

This type of stress will allow us to know whether the bank is managing its fragile clients well or whether this management would not be sufficient in times of crisis. The stress test gave the following results:

The constitution of classified receivables and their provisioning

Table 16

Results after scenario 6 on classified claims

- Algerian dinars -

Categories	NPL before the shock	Provisions before the shock	NPL after the shock	Loss provision	Provisions after the shock
Category 1	286.031	73.312	16.876.031	3.318.000	3.391.312
Category 2	1.742.214	821.160	1.742.214	0	821.160
Category 3	3.432.612	3.255.366	3.432.612	0	3.255.366
Total	5.460.856	4.149.838	22.050.856	3.318.000	7.467.838

Source: authors

$$Allocation\ to\ provisions = amount\ of\ the\ Watch\ List\ receivables * 20\%$$

As regards the solvency ratio, the results obtained are as follows:

Table 17

Results after scenario 6 on the solvency ratio

- Algerian dinars -

	Before shock	After shock
Capital requirement	16.683.590	13.365.590
RWA	144.953.023	144.953.023
CAR (%)	11,51%	9,22%

Source: authors

The impact of a 5% drop in the bank's earnings added t this scenario:

Table 18

Results after scenario 6 with drop in the result

- Algerian dinars -

	Before shock	After shock
Bank result	1.985.717	1.886.431
Capital requirement	16.683.590	13.266.304
RWA	144.953.023	144.953.023
CAR (%)	11,51%	9,15%

Source: authors

The results of this stress show that with or without the additional decrease in the bank's result, the bank would record a solvency ratio below the threshold regulatory. The bank should then take an even greater interest in the management of Watch List customers.

4.7. Scenario seven: Declassification of receivables from one class to another

In this scenario, we performed the same shock as in the second scenario, the only difference being the intensity applied. We proceeded to downgrade the claims, class by class, as follows:

- The downgrades to category 1: 10% of current receivables. Receivables in category 0.
- Downgrading to category 2 of all existing potential problem receivables.
- Downgrading to category 3 of existing high-risk receivables.

The results are as follows:

The constitution of classified receivables and their provisioning

Table 19

Results after scenario 7 on classified claims

- Algerian dinars -

Categories	NPL before the shock	Provisions before the shock	NPL after the shock	Loss provision	Provisions after the shock
Category 1	286.031	73.312	15.868.688	3.173.738	3.173.738
Category 2	1.742.214	821.160	286.031	106.359	179.671
Category 3	3.432.612	3.255.366	5.174.826	921.054	4.997.580
Total	5.460.856	4.149.838	21.329.544	4.201.151	8.350.989

Source: authors

The method of calculating provisions is the same as that of scenario 2.

The constitution of equity capital and the solvency ratio after the shock

Table 20

Results after scenario 7 on the solvency ratio

- Algerian dinars -

	Before shock	After shock
Capital requirement	16.683.590	12.482.439
RWA	144.953.023	144.953.023
CAR (%)	11,51%	8,61%

Source: authors

The 5% deterioration of the bank's result intensifies the shock and gives as results:

Table 21

Results after scenario 7 on the solvency ratio

- Algerian dinars -

	Before shock	After shock
Bank result	1.985.717	1.886.431
Capital requirement	16.683.590	12.383.154
RWA	144.953.023	144.953.023
CAR (%)	11,51%	8,54%

Source: authors

This exercise shows that the application of the same shock with a higher intensity caused by a larger crisis would cause a deterioration in the bank's financial health.

4.8. Scenario eight: Deterioration of Watch List receivables and bad debts at the same time

A deterioration in the external environment generally affects all of the bank's variables at the same time. This test then aims to analyse the overall effect of a crisis on the bank's solvency.

The stress scenario is:

- Downgrade Watch List receivables and customers from category 0 to category 1;
- Downgrade receivables from category 1 to category 2, and those from category 2 to category 3.

The results of the test exercise are as follows:

Constitution of classified receivables and their provisioning

Table 22

Results after scenario 8 on classified claims

- Algerian dinars -

Categories	NPL before the shock	Provisions before the shock	NPL after the shock	Loss provision	Provisions after the shock
Category 1	286.031	73.312	16.592.976	3.318.595	3.318.595
Category 2	1.742.214	821.160	286.031	106.359	179.671
Category 3	3.432.612	3.255.366	5.174.826	921.054	4.997.580
Total	5.460.856	4.149.838	22.053.833	4.346.008	8.495.846

Source: authors

$$Provisions\ after\ shock = doubtful\ loans\ after\ shock * weighting\ rate$$

Results without taking into account the deterioration of the bank's results

Table 23

Results after scenario 8 on the solvency ratio

- Algerian dinars -

	Before shock	After shock
Capital requirement	16.683.590	12.337.582
RWA	144.953.023	144.953.023
CAR (%)	11,51%	8,51%

Source: authors

The results with the 5% drop in the bank's result give:

Table 24

Results after scenario 8 with a drop in the result

- Algerian dinars -

	Before shock	After shock
Bank result	1.985.717	1.886.431
Capital requirement	16.683.590	12.238.296
RWA	144.953.023	144.953.023
CAR (%)	11,51%	8,44%

Source: authors

The downgrading of the Watch List claims alone was already damaging the bank's financial health, so an additional shock would only further worsen the consequences for the bank. This is what the results of this test show, which gave a solvency ratio of 8.44%, compared to 9.15% for the Watch List downgrade alone.

The ratio was not very far from the regulatory limit, but the overall effect of the crisis on receivables as sensitive as those on the Watch List has caused it to fall even further, a situation that calls for more attention to be paid to this type of receivable. This test is probably more significant than those that involved stressing Watch List and independently classified claims separately. It better captures the overall impact of a crisis.

4.9. Scenario nine: Deterioration in credit scores

At this private bank, credits are rated on a scale from 1 to 12, where 12 is the worst rating. Customers rated eight are close to the category of customers to be monitored very closely and those rated between 9 and 10 are considered very sensitive and may at the slightest shock move into the doubtful category.

An economic downturn could affect the bank's customers who fit these descriptions. This is what we are going to see in this scenario, which consists of downgrading 50% of the customers who are rated eight and all those who have ratings between 9 and 10 to the category of doubtful customers. The consequences of such a shock are given in the following tables:

The constitution of classified receivables and their provisioning

Table 25

Results after scenario 9 on classified claims

- Algerian dinars -

Categories	NPL before the shock	Provisions before the shock	NPL after the shock	Loss provision	Provisions after the shock
Category 1	286.031	73.312	32.248.031	6.392.400	6.465.712
Category 2	1.742.214	821.160	1.742.214	0	821.160
Category 3	3.432.612	3.255.366	3.432.612	0	3.255.366
Total	5.460.856	4.149.838	37.422.856	6.392.400	10.542.238

Source: authors

The constitution of equity capital and the calculation of the solvency ratio

Table 26

Results after scenario 9 on the solvency ratio

- Algerian dinars -

	Before shock	After shock
Capital requirement	16.683.590	10.291.190
RWA	144.953.023	144.953.023
CAR (%)	11,51%	7,1%

Source: authors

The bank did not respond well to this test because we note that the solvency ratio is 7.10%, it is therefore below the regulatory limit of 9.5%. However, in order to take into consideration all the assumptions that may accompany this shock; we will analyze the magnitude of the consequences of this scenario if the bank had to suffer a 7% deterioration in its earnings.

The following table gives the solvency ratio under these circumstances:

Table 27

Results after scenario 9 with drop in the result

- Algerian dinars -

	Before shock	After shock
Bank result	1.985.717	1.846.717
Capital requirement	16.683.590	10.152.190
RWA	144.953.023	144.953.023
CAR (%)	11,51%	7,0%

Source: authors

As expected, the solvency ratio is even lower. This scenario shows once again the importance of managing customers who need to be monitored very closely and those who are not in a very strong position.

4.10. Scenario ten: Deterioration of current receivables with high intensity

This scenario consists of downgrading 20% of the bank's current claims to the class of potential problem claims. This is a shock of very high intensity but is based on events that may occur. We quote some of them:

- The 50% downgrading of claims in the three main sectors of activity;
- The downgrading of all the claims held on the automotive sector and those of companies related to this sector;
- A 50% write-down of the top 10.

If any of these events were to occur, the bank would see 20% of these current claims downgraded to potentially problematic claims. The results we have obtained are as follows:

The constitution of the classified debts and their provisioning

Table 28

Results after scenario 10 on classified claims

- Algerian dinars -

Categories	NPL before the shock	Provisions before the shock	NPL after the shock	Loss provision	Provisions after the shock
Category 1	286.031	73.312	32.017.453	6.346.284	6.419.596
Category 2	1.742.214	821.160	1.742.214	0	821.160
Category 3	3.432.612	3.255.366	3.432.612	0	3.255.366
Total	5.460.856	4.149.838	37.192.278	6.346.284	10.496.122

Source: authors

The constitution of equity capital and the solvency ratio after the shock

Table 29

Results after scenario 10 on the solvency ratio

- Algerian dinars -

	Before shock	After shock
Capital requirement	16.683.590	10.337.306
RWA	144.953.023	144.953.023
CAR (%)	11,51%	7,13%

Source: authors

We intensify this shock by assuming that a reversal of the macroeconomic situation would affect the result and make it decrease by 7% of its present value. We obtain the following results:

Table 30

Results after scenario 10 with drop in the result

- Algerian dinars -

	Before shock	After shock
Bank result	1.985.717	1.846.717
Capital requirement	16.683.590	10.198.305
RWA	144.953.023	144.953.023
CAR (%)	11,51%	7,04%

Source: authors

The application of this shock caused a sharp increase in the cost of risk, leading to a reduction for capital and a solvency ratio below the limit set by the regulator. This exercise has just shown that if Scenario 1 were to occur with greater intensity, the financial health of the bank would be affected.

4.11. Scenario eleven: Very high-intensity debt downgrades

The last test that we are going to carry out consists in analyzing the impact of a shock of very high intensity that affects several variables at the same time. It cumulates the effect of several scenarios carried out previously and is based on the following hypotheses:

- Downgrading of 20% of current receivables and receivables from category 0 to category 1 of classified receivables;
- Downgrading of receivables from category 1 to category 2 and those from category 2 to category 3.

The results obtained are as follows:

The constitution of classified receivables and their provisioning

Table 31

Results after scenario 11 on classified claims

- Algerian dinars -

Categories	NPL before the shock	Provisions before the shock	NPL after the shock	Loss provision	Provisions after the shock
Category 1	286.031	73.312	31.734.399	6.346.880	6.346.880
Category 2	1.742.214	821.160	286.031	106.359	927.520
Category 3	3.432.612	3.255.366	5.174.826	921.054	4.176.420
Total	5.460.856	4.149.838	37.195.255	7.374.293	11.450.819

Source: authors

$$Provisions\ after\ shock = claims\ after\ shock * provisioning\ rate$$

$$Provisioning\ allocation = Provisions\ after\ shock - Provisions\ before\ shock$$

Constitution of equity capital and solvency ratio after shock

Table 32

Results after scenario 11 on the solvency ratio

- Algerian dinars -

	Before shock	After shock
Capital requirement	16.683.590	9.309.297
RWA	144.953.023	144.953.023
CAR (%)	11,51%	6,42%

Source: authors

As the situation has changed a lot, we expect a lower result than the current one. We will therefore add to the scenario the fact that the result loses 10% of its current value. The result obtained is:

Table 33

Results after scenario 11 with a drop in the result

- Algerian dinars -

	Before shock	After shock
Bank result	1.985.717	1.787.145
Capital requirement	16.683.590	9.110.725
RWA	144.953.023	144.953.023
CAR (%)	11,51%	6,29%

Source: authors

The solvency ratio obtained by exercising this shock is 6.29%, the lowest coefficient recorded since the beginning of the application of the stress tests. We can then say that this scenario is the worst of all and that its occurrence could disrupt the bank's activity.

5. Discussion and conclusion

Through the application of stress tests on the bank's portfolio of commitments, we have observed that the bank has responded well to certain stresses and has reacted less well to others. This is due to the types of shocks applied and their intensities.

Indeed, we found that the cost of risk resulting from stress varied from one scenario to another. Sometimes the bank was able to cope without jeopardizing its financial soundness as in scenarios 1, 2, 3 and 4, and other times, as in scenarios 5, 6, 7, 8, 9, 10 and 11, the bank bore this cost less well and consequently recorded solvency ratios below the regulatory limit. The solution to remedy such situations is an increase in shareholders' equity, which can be achieved by increasing the bank's share capital or by reducing the dividends to be distributed to shareholders.

We have also noted that there are more sensitive claims than others in the portfolio, such as Watch List claims and those held on the main business sectors financed by the bank. The latter require more rigorous monitoring. Indeed, the bank could cap the amounts of loans to be granted to sectors of activity that are exposed to changes that could adversely affect its portfolio and should try to reduce the number of Watch List clients by providing them with advice that would help them improve their situations.

After the quantitative estimation of likely scenarios, financial institutions could take measures that serve to minimize the impact of the most severe scenarios. A good understanding of the nature of the risks is an advantage when implementing these instruments. Scenarios can be generated in many ways. One way is to consider severe shocks to a single market aggregate. An extension is to consider such shocks for all market aggregates based on past extreme variations. The best model remains the use of supervisory judgment and practice to generate pessimistic but plausible scenarios.

Financial institutions sometimes run reverse stress tests with algorithms to detect extremely dangerous scenarios. These scenarios must be comprehensive and embrace systemic risk. Supervisors require banks to have capital based on the scenarios performed. It is necessary to be innovative in the preparation of scenarios. One of the conditions is to have more than twenty years of historical data and to select as scenarios the riskiest events of this phase. Generally, especially when the financial situation is stable, the results of the stress tests are forgotten.

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GLOBALIZATION, TAX POLICY AND TAX HAVENS. SOME CRITICAL CONSIDERATIONS

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Abstract

The aim of the paper is to highlight, at a theoretical level, the effects of globalization on fiscal policy, as well as the issue of profit shifting at OECD level, given that, although substantial progress has been made internationally in multilateral fiscal coordination, it remains at a significant level, and the estimated loss of income for advanced economies reaches up to a third of the taxes collected. For developing countries, given their greater dependence on corporate taxes, the losses may be even higher. Therefore, measures are needed to reduce the tax revenues losses, namely excess profits taxes, the wealth taxes or the United Nation tax convention. The methodology was a descriptive one, using various bibliographic sources, mainly from foreign literature: scientific articles, relevant analysis and studies in the field of reference, legislation, official documents of various tax bodies.

Keywords: taxation; profit shifting; international tax regulations; tax competition; corporations

JEL Classification: F23; H25; H26

1. Introduction

The globalization and digitalisation of the economy have led to significant changes in tax systems globally, due in particular to increased fiscal mobility at the territorial level. Taxation strategies have changed, depending on the conditions imposed by trading partners, international agreements, negotiations, or competition.

With the increasing openness / integration of trade in goods and the mobility of factors, the authorities face two challenges, namely the increase in demand for the consumption of public goods (Rodrik 1998,

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Epifani and Gancia 2009), and the erosion of some tax bases due to their mobility across national borders and, thus, the ability to “escape” from paying high taxes, which forces governments to reduce tax rates (Devereux, Lockwood, & Redoano, 2008, Kleven et al., 2014).

Therefore, there are numerous studies in the specialized literature that focus on the effect of globalization on fiscal policy. According to them, globalization has a positive effect on companies (Garrett, 1995, Quinn, 1997 or Swank, 1998), but others contradict this, especially due to tax avoidance (Bretschger and Hettich, 2002 or Kenny and Winer, 2006). Also, some papers focus on corporate taxation by analyzing the impact of globalization on corporate taxes as a percentage of GDP, with findings suggesting that globalization has a positive effect on corporate tax (as Swank, 1998), but also a negative or neutral effect (as Slemrod, 2004). The same results were obtained when using the corporate tax rate.

One result of this process is that a higher level of public spending must be financed by a declining range of tax bases. In the last quarter of the century, several governments have run tax incentive programs to offset global shocks, while tax rates on mobile base and corporate profits have dropped significantly (Flamant, Godar, and Richard, 2021).

A negative effect of globalization is, as I mentioned above, the avoidance of profit taxation. New ways have been created to avoid paying taxes: multinational companies transfer profits to places with low taxes; countries compete by lowering tax rates; wealthy individuals can move their fortunes to tax havens.

The paper presents the following aspects: presentation of OECD proposals on tax base erosion and profit shifting, "description" of fiscal policy in the context of globalization, within the European Union ("future" of tax policy), aspects of profit shifting and international tax competition (tax havens) and some effects on global revenues.

2. Some theoretical aspects of OECD proposals

In recent years, multinational companies in almost all economic sectors have registered a significant increase in global revenues, an increase that comes largely from Asia, Africa or Eastern and Central Europe, where employment growth and living standards have led to an increase in the consumption of goods and services. In order to benefit from this development, the states have entered into a continuous

process of attracting foreign investment, by granting various economic facilities or subsidies, most often in close competition with neighboring states.

If initially the aim, at global level, was to increase the number of jobs, in recent years there has been a focus on discussions about the level of taxes and fees paid by new investors, especially the profit tax and how to establish it.

If a multinational group makes large profits, each state in which it operates through a subsidiary is interested in collecting as much of the overall profit as possible. At the same time, the group has an interest in reducing its level of tax paid globally, so that shareholders can benefit from dividends as high as possible, which is done through various methods and schemes, legal or in the gray area. The purpose of these schemes is, in general, to shift profits from high-tax countries to low-tax countries or to reduce the tax base in high-tax countries by making various payments without economic substance. These levers are implemented through transactions between group companies.

To limit the effects of these practices, the OECD has created, since the 1970s, a series of rules on the taxation of transactions between companies belonging to the same multinational group, structured in the OECD Guide on Transfer Pricing[1]. There have been various opinions on how to regulate transfer pricing, one of these being the application of a formula and on its base is established the taxable profit attributed to each company in the group, taking into account the importance of that company in the creative chain of economic value. However, this variant has not materialized, mainly due to the lack of consensus on the formula itself, and in present is applied the principle of arm length, also called the principle of full competition, namely prices in transactions between companies of the same group must be comparable at prices set between independent companies under similar economic conditions.

At global level, there are discussions about the profits made by multinational groups and how they should be taxed in order to increase the amount of money attracted to state budgets (OECD, 2020). Even in Romania, it is discussed that multinationals invest, due to the low costs and facilities offered by the state, but move the profit made by

[1] *Transfer prices are those prices set between companies part of the same group (affiliated parties) for any type of transaction - sale of goods, provision of services, provision of financing, right to use intellectual property, etc.*

the local company to other companies within the group, for tax or economic purposes.

Also, recently, the actions to verify the transactions carried out between the group companies have been intensified and attempts are being made to make the so-called transfer price adjustments, which ultimately lead to an increase in the level of taxable profit of the company in that country. An example is the investigation launched by the European Commission into the taxation of profits from US IT industry groups, such as Apple, Google or Amazon, from activities in the EU. The additional tax claimed by the Commission in these cases is billions of euros.

The OECD's most recent approach to limiting tax evasion and regulating the taxation of multinational groups is the Base Erosion and Profit Shifting Plan (BEPS). The OECD estimates that the world is losing about $ 100 billion to $ 240 billion in revenue worldwide as a result of the shift in profits and the erosion of the tax base.

The adopted plan, including in the EU, proposes, among other things, that multinational groups submit country-by-country reporting to tax authorities, which will include information on all subsidiaries, including country of residence, profits earned and level of tax paid. Through this reporting, states want to achieve full transparency in how groups structure their profits for tax purposes and try to stop the use of tax havens.

OECD concerns about global taxation also influence, directly or through European legislation, Romanian taxation. The BEPS initiative, launched several years ago by the OECD, with the aim of establishing a tax system at the level of multinational companies that is as fair as possible for the states in which they obtain income, is taking new forms and is targeting more and more areas.

The latest proposals focus on the two tax pillars of multinationals (the minimum global profit tax of 15%, and the mechanism of profit distribution in the source countries):

Pillar I is designed to ensure a fairer distribution of rights to tax the profits of multinational companies between the countries from which they are obtained. Thus, part of the profits made will be allocated for taxation to the countries in which the respective companies carry out commercial activities and make profits, regardless of whether or not they have a physical presence in the respective states.

Pillar II imposes a 15% minimum global corporate tax rate on companies with revenues of more than € 750 million a year and is

estimated to generate around $ 150 billion in additional tax revenue each year. Other benefits are expected from the stabilization of the international tax system and the increase in predictability for taxpayers and tax administrations.

If an agreement was reached on the global minimum tax in July 2021 (and later finalized on October 31, 2021), the agreement on Pillar I was announced in early October 2021. It was developed as an alternative to the digital tax and involves the allocation of a part from the profits obtained by large companies to the states from which they derive income, but in which they have no tax residence. According to an analysis conducted by EconPol (2021), under the provisions of the first pillar would enter 78 of the largest 500 companies in the world, and the total amount that would be allocated to the states that contribute to the realization of profits is estimated at 87 billion dollars. Nearly $ 30 billion of that amount would come from US-based technology giants alone - Apple, Microsoft, Alphabet, Intel and Facebook.

The countries that will benefit from the implementation of the first pillar are those from which the companies concerned obtain revenues, but which do not currently have the right to tax them. Among them is Romania, which could obtain the right to tax part of the profits recorded by large companies from the sale of products and services on its territory or from its citizens, even if these companies do not have a physical presence in our country (Bădin, 2021). However, the actual impact can only be estimated when the criteria for reallocating tax rights will be defined and after the OECD recommendations have been transposed into European and / or national legislation.

3. The future of fiscal policy in the context of globalization, within the European Union

We believe that the "future" of global taxation is characterized by a high degree of uncertainty, because so far, several measures have been proposed aimed at limiting the (negative) effects of globalization, but there are few concrete results.

We turn our attention to three possible scenarios for the EU, namely how fiscal policy is affected in general, given that: **1**. **the EU continues on its current path (carrying on**) - everything remains the same, **2. nothing but the single market**, where the focus is the free movement of capital and goods and the maintenance of fair conditions of competition; on the other hand, the free movement of workers and

services is no longer guaranteed; **3. doing more together**, which results in greater coordination in social and fiscal matters, as well as greater involvement in financial services.

For EU Member States' tax regimes, each context under review can have important implications for: direct and indirect tax bases and rates; taxation of the digital economy; state aid; blacklist of EU tax havens; public country-by-country reporting; mandatory disclosures.

Scenario 1: Carrying on

The EU maintains its current course, the 27 Member States, focusing on implementing and modernizing the current reform agenda, which includes strengthening the single market, stimulating free trade and combating tax fraud, aggressive tax planning and the erosion of the tax base and profit shifting. Other initiatives could be introduced, which could relate to the harmonization of tax bases, the elimination of tax incentives or the coordination of taxation in the digital economy. For companies, although this context could bring considerable benefits, in some areas the tax burden will increase. Among other things, for example, the EU would effectively become the global supervisor of taxes in combating harmful tax practices and in promoting more "disclosures" of the tax affairs of multinationals.

Scenario 2: nothing but the single market. In this context, a potential effect would be to reduce regulation at EU level, while maintaining or deepening differences in fiscal policies; is uncertain whether and to what extent an EU-coordinated approach to harmonizing tax bases and combating tax base erosion (BEPS) would be possible; tax competition between EU Member States could also increase and reduce the focus on, for example, the fight against tax havens globally. As far as companies are concerned, some of them could benefit from increased tax competition between Member States.

Scenario 3: Doing more together. With regard to taxation, this context could allow progress to be made on strengthening the common tax base (CCCTB) at EU level; direct taxation could also follow the path of indirect taxation, by gradually harmonizing the tax base, finding solutions for the taxation of the digital economy; The idea of financing the EU budget by increasing European VAT revenues or the CCCTB is also being pursued.

In Table 1 we have outlined the effects of the three scenarios.

Table 1

Effects of the three scenarios on the fiscal components

Tax issues	1-carrying on	2-nothing but single market	3-doing more together
Duties			
Customs	No change - already harmonized	No change - already harmonized	No change - already harmonized
Excise	No change	Possible harmonization of rates	Harmonization of rates and possibly penalties
VAT			
Procedure	No change but ongoing discussion on breadth of destination principle	Possible adoption of definitive destination principle for all business to business (B2B) and business-to-consumer (B2C) transactions	Adoption of definitive destination principle for all B2B and B2C transactions
Rates	No change	Possible harmonization of exemptions	Harmonization of rates and exemptions
Personal taxes			
Income tax	No change	No change	No change unless there is significantcchange to the treaty
Wealth/ property tax	No change	No change	No change unless there is significant change to the treaty
Corporation tax			
Common corporate tax base CCCTB	unlikely	unlikely	likely
Rates	Remain under member state control	Remain under member state control	Possible harmonization in medium term

Tax issues	1-carrying on	2-nothing but single market	3-doing more together
Significant digital presence PE (permanent establisment)	depending on OECD agreement	Follow OECD	yes
Digital services tax (DST)	Possibly (absent a unified approach, some unilateral action by member state is likely)	unlikely	yes
Focus on avoidance	Continue as is	New initiatives unlikely	yes
Tax incentives	Allowed on national basis according to EU rules	Allowed on national basis according to EU rules	Depending on EU decisions
Public country-by-country reporting	possible	impossible	yes
EU blacklist and impact on third countries	Continue as is	Reduced activity	Increased use
Tax competition between countries	Will continue with rates and focused incentives	Will continue with rates and focused incentives	Largely eliminated
Compliance burden on companies	Largely the same; different rules remain in all member states	Largely the same but less EU intervention in future; different rules remain in all member states	Significant short term change/disruption but leading to greatly reduced difference in member states

Source: KPMG (2018)

Therefore, we believe that scenario 3, in which more is done together, in other words, cooperation and good understanding at the level of international/European institutions, being essential in achieving the proposed objectives, is the most appropriate.

4. Profit shifting, international tax competition and tax havens. Some economic effects

Companies with international activities have learned to take advantage of gaps and asymmetries between national tax systems to reduce the tax burden; the absence of consistent fiscal coordination between jurisdictions at international level offers companies opportunities for arbitration, leading both to the relocation of tax bases abroad (profit transfer) and to the erosion of these tax bases.

Increased capital mobility, widespread practices of aggressive tax planning by multinational companies, and the behavior of some Member States to attract capital to their jurisdictions have led to the emergence of true international tax havens. The largest tax havens in the world are the OECD member states: the United Kingdom, the Netherlands and Luxembourg. Countries lose more than $ 480 billion annually due to global tax abuse.

Profit shifting and tax competition are major concerns in the international corporate tax system, with digitalisation creating new challenges. Developing countries, which rely more on corporate taxes (as sources of income), are at particular risk.

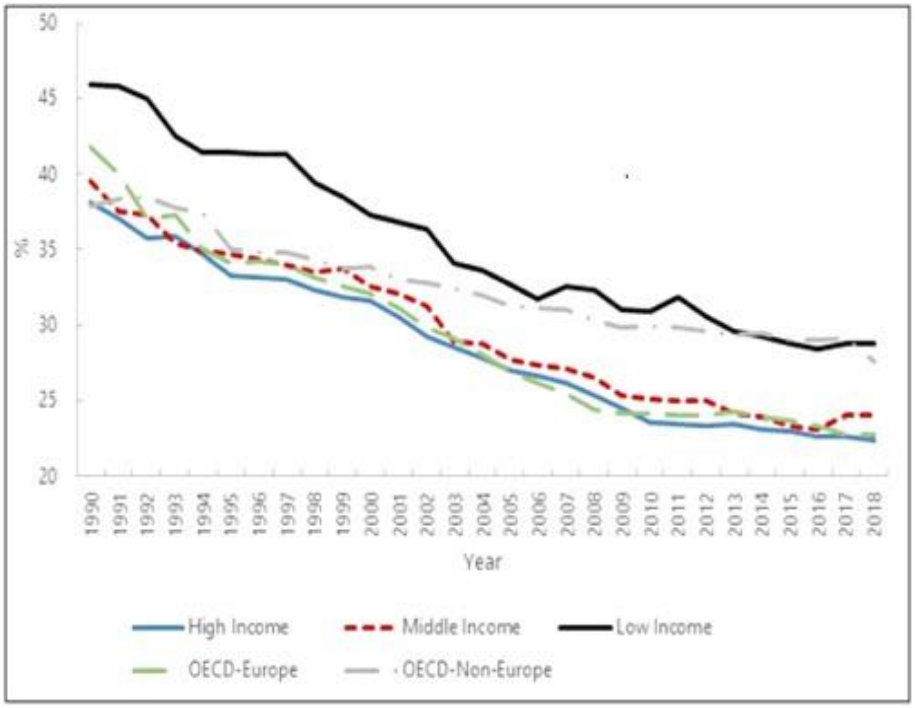
First, despite substantial progress in multilateral fiscal coordination, the transfer of profits of multinational companies is significant. The estimated loss of income for advanced economies is up to a third of the taxes collected. For developing countries, given their greater dependence on corporate taxes, the losses may be even higher. Therefore, the common rules in the project on the erosion of the tax base and the transfer of profit (BEPS) cannot largely prevent the transfer of profit.

Second, tax competition has led to a decline in corporate tax rates in high-, middle- and low-income countries alike.

Third, low-income countries are losing the income they need to reduce their poverty, in part because of their greater dependence on higher income tax revenues. And alternative sources of income, such as VAT, are difficult to expand in economies where the degree of informality is considerable. Moreover, the complexity of new global standards and common approaches is particularly difficult for countries with developing tax administrations and diverts attention from pressing domestic tax issues.

Figure 1

Trends in OECD profit tax rates



Source: IMF (2019)

A study of IMF (IMF, 2019) investigates the impact / effect produced in the transfer of profits by companies operating internationally on investment activities and the implications of profit shifting restrictions on future tax competition (Klemm and Liu, 2019). The conclusion is that "opportunities to change / shift profits unequivocally reduce capital costs in all countries analyzed", and that a "permissive attitude" towards profit shifting is a component of tax competition and that governments are unlikely to give up tax competition in the future.

Table 2

Effects of profit transfer on investment and tax competition

The impact of profit shifting on investment	Impact on tax competition
• Investments in high-tax countries may be higher if investors know they can avoid some taxes by shifting profits • More subtle, investors can also invest more in low-tax jurisdictions, as holding capital in that area can facilitate the transfer of profits to other jurisdictions as well.	• Tax competition is the process of lowering taxes to attract capital investment • The "permissive attitude" towards the transfer of profit is a component of tax competition • Governments can reduce effective tax levels by tolerating a "profit shifting behavior" • If the transfer of profits is limited by international coordination, governments may face stronger pressure to reduce direct tax levels, for example by lowering legal tax rates.

Source: Bauer (2020)

The BEPS project and other recent multilateral initiatives have focused on tax avoidance rather than tax competition, which may be more evident in trends in legal rates of corporate income tax (CIT), or special tax incentives.

It should be noted that developing countries face challenges in implementing BEPS due to their complexity and limited capacity. The main forms of profit transfer that affect them are less sophisticated than those that affect more advanced economies, and tax incentives are a predominant form of tax competition. While external support can contribute to capacity building, attention needs to be paid to internal rules and regulations.

As mentioned before, although BEPS measures have been implemented since 2016, the level of transferred profits remains quite high, being difficult to determine them. For example, according to Riedel (2018), transferred profit levels show an inverse correlation between statutory tax rates and reported profits, as high statutory rates reduce after-tax profits, so companies are likely to target highly profitable projects to jurisdictions with lower taxes. The author also finds that the level of profit shifted can vary from 5% to over 30%.

Rigorous anti-BEPS measures (foreign-controlled companies, country-by-country reporting of tax data, interest deductible limits) have increased government income from corporate taxes, but have also had an effect on real investment. For example, capitalization rules, according to Buettner, Overesch, & Wamser (2014), increase the cost

of capital and have negative effects on employment and investment, especially on foreign direct investment.

Also, Mooij & Liu (2018) found that the impact of more stringent regulations on transfer pricing is similar to the effect of increasing the corporate tax rate by a quarter. Another study (Overesch & Hubertus, 2019) found that transparency measures, such as country-by-country reporting, increase compliance costs and effective tax rates. Or, according to Klemm and Liu (2018), limiting the transfer of profit increases capital costs and can thus have direct effects on investment decisions and tax competition.

Theoretically, if governments compete for real investment from firms, partly by lower rates and perhaps lax attitudes toward profit shifting, eliminating the benefits of shifting it will change incentives for companies as they decide where to invest. Klemm and Liu support their arguments by pointing to research that shows the link between the costs of transferring profits and the effects of investments. Higher tax costs have an impact on real investment decisions, and compliance costs associated with proposed policies could change incentives for firms to enter new markets.

Below, in Table 3, we present the situation of the transfer of profits in the period 2015-2018.

Table 3

Profit shifting at global level, in the period 2015 - 2018 (estimations)

	2015	2016	2017	2018	Difference 2018-2015
Profits shifted (mld USD)	616	667	741	946	330
Profit shifted (% din foreign profits)	36,2	36,2	36,0	35,6	-0,6
Tax loss (mld USD)	188	195	212	243	55
Tax loss (% of corporate tax revenues)	9,0	8,8	9,0	9,9	0,9

Source: Torslov, Wier & Zucman (2021)

The above estimates are “pre-BEPS” for 2015 (when the BEPS plan has not been yet implemented; it has been in force since 2016), and post-BEPS for 2018. And there are still significant profit shifting opportunities; the difference in profit transferred in 2018 compared to 2015 is $ 330 billion.

For Romania, the situation is displayed below, in Table 4.

Table 4

Profits lost in tax havens, Romania

	Profits lost (mil USD)	Tax revenue lost (mil USD)	Tax revenue lost (% of corporate tax revenue)
Total tax havens	1,723	276	7%
EU tax havens	1,344	215	5%
Belgium	287	46	1%
Cyprus	17	3	0%
Ireland	96	15	0%
Luxembourg	292	47	1%
Malta	88	14	0%
Netherlands	564	90	2%
non-UE tax havens	380	61	1%
Switzerland	60	10	0%
Bermuda, Caribbean, Puerto Rico, Hong Kong, Singapore, and others	320	51	1%

Source: Torslov, Wier & Zucman (2021)

Compared to the profit losses of developed countries, Romania loses 7% of its corporate tax revenues due to these tax havens (276 million dollars), 5% going to the European Union and $ 215 million, respectively, in countries such as Belgium, Luxembourg or Netherlands.

At global level, according to The State of Tax Justice Report (Tax Justice Network, 2021) countries lose 483 billion dollars in revenues a year, composed of $312 billion due to cross-border corporate tax abuse and $171 billion due to offshore tax abuse by wealthy individuals. Global tax abuse continues to hit lower income countries more severely than higher income countries. While higher income countries lose more tax in absolute number, their tax losses represent a smaller share of their revenues (9,7 per cent). Lower income countries in comparison collectively lose the equivalent of nearly half (48 per cent) of their public health budgets.

Table 5

Tax revenue losses at regional level, 2021

	Total annual tax loss (USD million)	Total annual tax loss (% of GDP)	of which: Corporate tax abuse (USD million)	of which: Offshore wealth (USD million)
Africa	17.117,5	0,7%	14.796,79	2.320,7
Asia	76.946,7	0,3%	52.391,9	24.554,8
Caribbean and American islands	1.605,7	0,6%	943,5	662,2
Europe	225.221,0	1,1%	126.012,7	99.208,3
Latin America	35.583,1	0,6%	32.247,1	3.336,0
Northern America	118.795,8	0,6%	80.390,6	38.405,2
Oceania	7.641,1	0,5%	5.404,5	2.236,6

Source: Tax Justice Network (2021)

From the table above, we see that in Europe there is the largest loss of tax revenue, mainly due to corporate tax abuse, followed by North America and Asia.

Thus, in order to stop/ reduce these large tax revenues losses, it is recommended that the authorities to introduce:

- *excess profit tax* on multinational corporations making excess profits during the pandemic (for example, global digital companies, in order to cut through profit shifting abuses). Multinational corporations' excess profit would be identified at the global level, not the national level, to prevent corporations from underreporting their profits by shifting them into tax havens, and taxed using a unitary tax method.

- *wealth tax*, through which to help reduce inequalities, which were exacerbated during the pandemic years, by taxing illegally held offshore assets. The pandemic has led to a significant increase in the wealth of the rich, even though unemployment has risen to record levels in many countries.

- *UN tax convention*, which means to shift the responsibility of setting tax rules from the OECD to the UN (United Nation); a UN tax convention in made up of an intergovernmental UN forum for the urgent negotiation of further changes to the international tax rules and a

Centre for Monitoring Taxing Rights to raise national accountability for illicit financial flows and tax abuse suffered by others.

5. Conclusions

In this paper we have presented some considerations, from a theoretical point of view, regarding globalization and its implications on fiscal policy, the appearance of tax havens being a direct consequence of this process. In this regard, we used relevant bibliographic references from the specialized literature, the conclusion being that, despite substantial progress in multilateral fiscal coordination, the profit shifting of multinational companies is still significant and the estimated loss of income for advanced economies is up to a third of the corporate income tax collected. For developing countries, given their greater dependence on corporate taxes (sources of income), the losses may be even higher.

In recent years, multinational companies in almost all economic sectors have recorded a significant increase in global revenues, an increase that comes largely from Asia, Africa or Eastern and Central Europe, where employment growth and living standards have led to an increase in the consumption of goods and services. To benefit from this development, states have entered a continuous process of attracting foreign investment, by providing various economic facilities or subsidies, often in close competition with neighboring states.

Increased capital mobility, widespread practices of aggressive tax planning by multinational companies, and the behavior of some Member States to attract capital to their jurisdictions have led to the appearance of international tax havens. The largest tax havens in the world are the OECD member states: the United Kingdom, the Netherlands and Luxembourg. According to the latest estimates, countries lose more than $ 480 billion annually due to global tax abuse.

Other effects of profit shifting in tax havens, besides affecting the tax revenues, we consider that they are: decrease in revenues to the domestic budgets, deepen inequalities between individuals and economic actors in the economic and social context, the lack of transparency of national and national public finances, which makes it possible to link business and investment funds with funds from crime (Lénártová, 2020).

According to the latest OECD tax regulations (OECD, 2021), the 15% global minimum tax might reduce corporate profit shifting and

induce a realignment of profits with economic activity; also, other recommendations are related to the introduction of the pandemic excess profits taxes and the wealth taxes or the United Nation tax convention.

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AN ATTEMPT TO DESIGN A FISCAL PROFILE OF THE ROMANIAN TAX SYSTEM

Ionel LEONIDA, PhD*

Abstract

In this paper we analyse the Romanian tax system in terms of tax structure and tax rates, in relation to countries in the geographical area of Romania, trying to configure a tax profile of the Romanian tax system. The methodology used combines the empirical analysis of statistical data and their interpretation, with the identification of causalities, in convergence with the objective. The debate and concern are justified by the fact that there are no concrete pragmatic "recipes" for adjustments to guarantee the success of fiscal policy measures, but there are theories that are valid under certain conditions, many of them in conditions of relative economic stability, aiming at adjustments and fine adjustments, with discreet effects on the economy, and less optimal solutions to shocks of the magnitude of recent ones. The results obtained, we appreciate, reflect the current general situation of the Romanian tax system, revealing adjustable and improved aspects, which may prove useful in future more complex analysis of tax authorities in the design of a medium- and long-term fiscal strategy.

Keywords: tax structure; tax revenue, tax rates, tax regime, tax competition

JEL Classification: F65; H11; H20

1. Introduction

The adjustment of national tax systems is a constant concern of the authorities, economic and financial organizations but, at the same time, a frequent topic in the attention of academia, in scientific

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and technical debates, even philosophical, receiving confirmations or criticisms of adjustment measures. tax. As mentioned above, the debate and concern are justified by the fact that there are no concrete pragmatic "recipes" for adjustments to ensure the success of fiscal policy measures, but there are theories that are valid under certain conditions, many of them in terms of relative stability. aiming for fine adjustments and adjustments, with discrete impacts on the economy, and fewer solutions to shocks of the magnitude of those of 2008-2010 and 2020-2021. Moreover, even if certain theoretical tax “recipes” are outlined, their practical implementation in different countries, with different economic structures and levels of development, with cultural and educational differences, positioned in different geographical regions, leads to different results.

On the other hand, in a global, Community and regional context, in the context of the free movement of capital and labour, there are competitive effects between tax systems in neighbouring countries or in a particular region, which in most cases, leads to a reduction in tax rates, the granting of certain tax incentives, issues affecting the size of tax revenues and, consequently, a chain of negative effects on the size of budget expenditures, the budget deficit and indebtedness.

The topic is not new, there are approaches in this area of the fiscal structure, especially in the form of regular reports of some institutions European Union (EU), Organisation for Economic Co-operation and Development (OECD) and International Monetary Fund (IMF), but we appreciate the fact that the fiscal-budgetary and economic systems are dynamic and require permanently certain more discreet or wider adjustments, depending on the global, regional or national economic and social situation.

2. Literature review

The existing literature on taxation is extensive, but in the approach of the paper we aim at studies closer to the topic, this being less present and included, in particular, in analytical and evolutionary reports prepared by financial and economic institutions, such as those mentioned.

The dominant tax literature is the impact of taxation on economic performance, in the sense of the study by Lee and Gordon (2005), which assesses tax structures and their impact on economic growth in the last three decades of the twentieth century, reaching

concluded that income tax negatively affects economic growth, while personal income taxes do not have a significant impact on it, a result also confirmed by Arnold (2008), following the assessment of tax structures in OECD countries over a period of time. over 30 years. The author also concludes that property and consumption taxation support economic growth.

Other authors, such as Myles (2009) and Johansson et al. (2008) argue that income taxes are more detrimental to growth (as they affect disposable income for consumption, savings, and / or investment) than property, consumption, or environmental taxes.

Kiser and Steven (2017) update their concerns about political economy theories to provide an analytical history of tax systems, focusing on the determinants of total tax revenue, tax structure, and tax administration. The authors identify the favourable and unfavourable circumstances that have accompanied the tax systems from distant periods to the present day.

Grdinić, Drezgić, and Blažić (2017) conducted an assessment of the correlation between economic development and fiscal composition in Central and Eastern European countries, finding different tax effects from existing literature that studied the effects of taxation in OECD countries. More specifically, the authors argue that there is a negative impact of all taxes on economic growth, stressing that income taxes are the most harmful to it.

Dziemianowicz (2019), in a study that captures tax trends and changes in OECD countries, concludes that the models of tax systems are influenced by the specifics of each country, from a structural point of view, and the evolution of fiscal policies is influenced by historical conditions. changes in macroeconomic conditions. The author seeks to identify by analysing the fiscal policies implemented in the OECD, similarities and differences in response to global conditions and identifies that the general trend in the reform of tax systems is relatively similar.

Theoretical studies on the structure of taxation, on its optimality, were elaborated by Atkinson and Stiglitz (1976). Later, various international institutions looked at optimizing the structure of taxation in terms of the efficiency of public finances and the stability of the business cycle. However, there are still concerns and debates about a more efficient fiscal structure, many approaches being theoretical and their results not directly functional / applicable to fiscal reforms.

The literature has not provided quick or accurate recipes to follow regarding the optimal tax, its practical design requires the use of direct and indirect taxes, thus leaving open the proportions of the optimal tax mix (Martinez-Vazquez, Vulovic and Liu, 2010). There are no theoretical and empirical studies available that provide exact proportions for an optimal fiscal structure. We therefore agree with the literature that the practical design of tax system reforms requires a balanced approach between the objectives of efficiency, equity, simplicity and revenue levels, while the tax structure is rather country-specific and depends on particular circumstances and company preferences.

3. Presentation of the analysis

In order to outline the general profile of the Romanian fiscal system, we perform a regional fiscal analysis through which we expose fiscal situations from relatively similar countries, the general criteria considered in the selection being the geographical position close to Romania, the year of accession to the EU, 2004 and 2007, the Eurozone.

The proposed indicators are predominantly from the sphere of revenues, these mainly reflecting quantitative and structural aspects, but also certain indicators that reflect the quality of the fiscal policy, respectively aspects of typology of the fiscal regimes adopted in the analysed countries.

Specifically, applying the selection criteria mentioned above, the countries included in the analysis are: Czech Republic, Hungary, Poland, Bulgaria, and Romania. We will call this group of countries G5. The analysed period is 2010 - 2020 but restricted in the sense that we will make its average for each indicator / country, this including the history of economic events.

The indicators selected for the analysis of income evolution, presented in Table 1, are related to Gross Domestic Product (GDP), to reflect the connection with the economic dynamics of each country. For representation, the following notations will be used:

- Romania registers a value lower than the G5 average, the notation 1 will be used;
- Romania has a value similar to the G5 average, notation 2 will be used;

- Romania has a value higher than the G5 average, the notation 3 will be used.

The share of total revenues in GDP - in general there are significant disproportions, being a gap of approx. 11 pp, between the highest and lowest weight. Regarding Romania, it is positioned in a lower situation compared to the G5 average, and inside the G5, it is in the last position, registering approx. -11 pp compared to Hungary, the best positioned at approx. -2 pp, compared to Bulgaria, the penultimate ranked, and compared to the G5 average, is approx. -5,5 pp.

The share of revenues from direct taxation in GDP - in general, the share of this category of tax revenues is more balanced, the gap being approx. 2,2 pp. Romania is in a lower position compared to the G5 average, and inside the G5, Romania is in the penultimate position, registering approx. 0,4 pp over Bulgaria, the weakest position at approx. -2 pp compared to the Czech Republic, the best positioned, and at approx. -0,8 pp compared to the G5 average.

In the structure of direct incomes, at the level of the G5 average, the taxation of the incomes of the natural persons holds the most important share in their constitution, respectively 60%, and the remaining 40% represents the contribution of the taxation of the incomes of the legal persons. This situation is found, with some fluctuations, in all G5 countries.

It should be noted that Romania has a higher share of revenues from the taxation of legal entities than the G5 average, ahead of member states such as Bulgaria, Hungary and Poland, ranking second, after the Czech Republic, and a share of revenues from income taxation. individuals below the G5 average, in the penultimate position, ahead of Bulgaria.

The share of revenues from indirect taxation in GDP - in general, the share of this category of revenues is relatively unbalanced, at G5 the gap is approx. 6 pp. This category of tax revenue has a significant contribution to the formation of income (44%), followed by income from social contributions (35%) and income from direct taxation (21%). Romania is in a lower position compared to the G5 average, and inside the G5, Romania is in the last position, at approx. -6 pp, compared to Hungary, the best positioned, and at approx. -2 pp, compared to the G5 average.

In the structure of indirect revenues, at the level of the G5 average, there is a certain balance between the contributions of the two main components (revenues from VAT and revenues from excise

duties and other taxes). It should be mentioned that Romania ranks fourth in the share of VAT revenues and in fifth place in the share of excise and other taxes revenues.

Table 1

Share of total revenues and their structure in GDP, in the Czech Republic, Hungary, Bulgaria, Poland and Romania (individual and group average values), from 2010 to 2020

Indicator / country	BG	CZ	HU	PL	RO	Mediate G5	RO positioning
Share of total revenues in GDP (%)	28,6	34,8	37,8	33,3	**26,8**	32,3	**1**
The share of direct tax revenues in GDP (%)	5,4	7,8	6,8	7,2	**5,8**	6,6	**1**
of which:							
- from personal taxation	3,0	4,2	5,0	4,7	**3,1**	4,0	**1**
- from corporate income taxation	2,4	3,6	1,8	2,5	**2,7**	2,6	**3**
Share of income from taxes and property taxes in GDP (%)	0,8	0,5	1,1	1,6	**0,8**	1,0	**1**
The share of indirect tax revenues in GDP (%)	15,0	12,0	18,1	13,5	**11,8**	14,1	**1**
of which:							
- from VAT	9,0	7,1	8,9	7,4	**7,3**	7,9	**1**
- from excise duties and other taxes	6,0	4,9	9,2	6,1	**4,5**	6,2	**1**
The share of income from social contributions in GDP (%)	7,8	14,9	12,7	13,5	**9,6**	11,7	**1**

Source: European Commission, Taxation Trends Report 2021, author calculations.

Share of social contributions in GDP - in general, the share of this category of income is relatively disproportionate, at G5 the gap is approx. 7 pp. Romania is positioned in a lower situation compared to the G5 average, and inside the G5, Romania is in the penultimate position, registering approx. 1,8 pp over Bulgaria, the weakest position at approx. -5,3 pp, compared to Hungary, the best positioned, and at approx. -2 pp, compared to the G5 average.

A general finding based on the comparative evaluations performed is that Romania is inferior to most of the analysed indicators in relation to the average and in the G5 structure, frequently alternating with Bulgaria the ranking on one of the last positions.

With regard to the tax regime, it cannot be easily traced properly and inadequately from the perspective of fiscal performance. However, against the background of the more frequent economic and non-economic crises, the growing need for budget revenues, the increased need for social equity, etc., we consider that a progressive fiscal regime is more encouraging for citizens and the economy, compared to a fiscal regime with proportional shares. Therefore, we denote by 3 the existence of the progressive quota and by 1 its absence or the unique quota. Calculating an average of the period, the alternation of the regimes can lead to a relatively ambiguous result, of transition from one regime to another, which we denote by 2.

Table 2

Average tax rates of some tax bases and the tax regime of personal income tax in the Czech Republic, Hungary, Bulgaria, Poland and Romania between 2010 and 2020

Indicator / country	BG	CZ	HU	PL	RO	Mediate G5	RO positioning
Personal income tax rate (%)	10,0	15,0	18,6	32,0	**14,4**	18,0	**1**
Fiscal regime of personal income tax	1	2	2	3	**1**	2	**1**
Corporate income tax rate (%)	10,0	19,0	17,0	19,0	**16,0**	16,2	**1**
Standard VAT rate (%)	20,0	20,7	26,6	22,9	**21,8**	22,4	**1**

Source: European Commission, Taxation Trends Report 2021, government information on tax regimes, author calculations.

The data from Table 2 are largely justifying factors for the dynamics of revenue shares in GDP, analysed above, namely the fact that Romania and Bulgaria have the lowest rates of income taxation of individuals and legal entities among G5 countries, being substantially below the G5 average, in terms of the average income tax rate of individuals, and in a more balanced but still lower situation, in terms of the average income tax rate of legal entities.

Another resulting aspect that can be linked to the evolution of the share of total revenues in GDP (or the share of revenues from direct taxation) is the typology of the tax regime, where Romania and Bulgaria are distinguished by single-rate tax regimes, compared to the other G5 member states, where there are progressive tax regimes and tax regimes in transition (from single quota to progressive quota or vice versa, the cases of the Czech Republic and Hungary).

4. Characteristics of the general profile of the Romanian tax system

The general finding regarding the situation of the Romanian tax system, resulting from the analysis of the evolution and structure of tax revenues and social security contributions in relation to GDP, reveals a general trend of decreasing tax rates and, consequently, a reduction the share of certain categories of income, a situation that affects the quality and stability of public finances.

These characteristics, which generate unsatisfactory revenues, affect the provision of a sufficient level of public goods and services, but also a certain rate of growth, diversification and modernization, while the quality of public finances is affected by increasing pressures on the budget deficit, This situation translates in the short and medium term into increasing public debt (a less obvious or perceived alternative among citizens) than the alternative of a revision of tax rates that can lead to unfavourable electoral consequences.

Fiscal homogeneity between Romania and this group seems to increase in terms of income structure, evolution and tax rates, aspects largely shaped by the aggressive fiscal competition in the region, most countries having a relatively similar history, being former countries communists, in the process of development, with insufficient infrastructure and the desire to attract foreign investment through fiscal mechanisms. However, within the Romanian fiscal system, certain

measures are needed to revitalize the revenues generated by it, in the sense that we make certain proposals.

5. Some possible measures to revitalize the Romanian tax system

In this regard, following the analysis, we have identified some tax issues that can be improved, which could contribute in the short and medium term to the reorientation of taxation, which we present below as potential alternatives for reflection and deepening for decision makers.

Boosting the income resulting from the taxation of personal income, this aspect representing, in our opinion, a weak point of the current tax system, with the lowest yield. One way to increase this income category may be to return a higher level of the single tax rate of at least 16%, as it was until 2017, the effect of this measure could contribute to increasing revenues from this tax base. with approx. 1,5% of GDP, a situation anticipated by analysing the impact on revenues by reducing the share from 16% to 10%. Another possibility is to plan for a further gradual increase in this rate at annual or biennial intervals, by 1 pp, to a predetermined level of tax rate, closer to the levels of average rates in the G5 region (18%).

Boosting the revenues resulting from the taxation of corporate income, this aspect also representing a weak and vulnerable point of the Romanian fiscal system, with a single tax rate of 16%, being close to the G5 average (16,2%). A general problem with tax systems is the taxation of multinational companies, which often manage to avoid taxes by overestimating imports and undervaluing exports, thus managing to distribute revenues to various regions of the globe that give them tax advantages. Measures have been taken at international and European level to limit this mechanism, namely in terms of taxation of income crossing international borders by the country of origin (source country) or by the country of residence of the beneficiaries of income (destination country). These steps have evolved, with new steps being taken recently, and this important reform of international taxation, according to the latest data, is to be implemented from 2023 and will mean that multinational companies will be subject to a tax rate of at least 15%, in any country would carry out its activity and generate profits. The implementation of these steps, to which Romania has also adhered, would bring benefits to our country by the fact that these tax

bases will no longer be eroded by various mechanisms, but will be effectively taxed in Romania.

Boosting the revenues resulting from VAT, they entered at the end of the period in a regression generated by the gradual reduction of the VAT rate from 24% in the period 2010-2015, to 20% in 2016 and to 19% in 2017, until present. A possibility to boost the income from this tax base can be represented by the progressive increase of the tax rate (similar to the proposal from the taxation of personal income), up to a predetermined level of the rate over a period of time, so that the changes can be "absorbed" by the economy without producing shocks to it. Another possibility for boosting revenues can be the significant improvement of compliance and collection, Romania being in first place in the European Union in losses from non-collection of VAT, respectively 35% of planned revenues. Administrative efforts at national level to increase VAT revenue collection are also supported by the European Union's significant efforts to improve the way VAT is collected through the creation of the Eurofisc network, which provides for the possibility of cooperation between Member States through national staff, the 27 Member States, and Norway.

The general finding is that the Romanian tax system tends to degrade the performance of its functions, especially in terms of ensuring a satisfactory level of budget revenues, lack of resources for public investment and a deepening effect of inequalities in society, accentuated of the proportional quota tax regime. Against this background, we consider that certain internal measures are needed to revitalize the tax system and its functions, at national level, and in this sense the international initiatives on fiscal reform are also oriented in this direction of restricting competition taxation, profit taxation and increasing administrative capacity, all of which have the effect of increasing tax revenue.

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