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C O N T E N T

COMBINING MONETARY, FISCAL, AND STRUCTURAL APPROACHES TO MODEL ALBANIAN INFLATION

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ABSTRACT

In the current context of high uncertainty in the global economy and global commodity price rises, this article investigates empirically the driving forces of inflation in Albania through combining several approaches, focusing especially on the developments in the food sector in general and cereals in particular, during the period from 2000 to first quarter 2022. Considering four measures of inflation such as: cereals, food, non-food, and headline inflation, it analysis the effects of domestic and foreign factors on inflation, using a vector error correction model (VECM), which allows to capture both the short-term and long-term effects. The study also considers the fiscal sector in examining inflation dynamics, which has been neglected so far in the current studies on this topic. The empirical analysis finds that domestic inflation is underpinned by disequilibria in the monetary, cereals and non-food sectors; in the short run, inflation is driven by structural factors (particularly agricultural output gap and imported inflation), as well as demand-side factors (especially money growth and public sector borrowing).

Key words: inflation; monetary, fiscal, structural factors

INTRODUCTION

In the current context of high uncertainty in the global economy, including the impact of the COVID-19 pandemic and geopolitical risks, global commodity prices have been on the rise over the recent months, and annual consumer price inflation readings have reached their highest levels in decades, both in developed and emerging markets, exceeding the expectations of many analysts and commentators worldwide. Such developments have intensified the debate and shifted collective attention to understanding the mechanisms that underpin inflation dynamics in Albania as well.

This article investigates empirically the driving forces of inflation in Albania, based on several approaches, namely the monetarist, fiscal and structuralist ones, focusing on the country's vulnerability against shocks affecting agriculture and exposure to external shocks. The model also incorporates demand-side factors, such as monetary and fiscal indicators. Headline inflation is disaggregated into various components (cereals, food and non-food items), since each of

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them may be driven by diverse factors. A vector error correction model is then estimated, which allows capturing both short- and long-term effects (through adjustment to equilibrium in the respective sectors) of domestic and external forces affecting inflation. The empirical findings reveal that domestic inflation is underpinned by disequilibria in the monetary, cereals and non-food sectors; in the short run, inflation is driven by structural factors (particularly agricultural output gap and imported inflation), as well as demand-side factors (especially money growth and public sector borrowing).

APPROACHES TO MODEL INFLATION

The interrelated nature of economic phenomena makes it empirically difficult to establish the sources of inflation (Ghatak, 1995; Thirlwall, 2003). Thus, the debate between advocates of different approaches remains present even nowadays, especially in the current context of the global price upsurges. This study combines the prominent approaches to inflation modelling, namely the monetary, the fiscal and the 'structuralist' theory of inflation, to specify the estimation models explaining the different inflation categories and to deepen further the understanding behind their dynamics.

Under the monetary view, inflation arises from imbalances in the money market, i.e. from excessive expansion of the exogenously determined supply of money relative to demand for real balances. On the other hand, the fiscal theory of inflation suggests that the fiscal deficit may affect the price level through its impact on money demand and thus the equilibrium in the money market. It describes equilibrium inflation as a function of fiscal deficit to the money stock ratio (Catão and Terrones, 2005; Gordon and Leeper, 2006).

Additionally, there is also the structuralist approach of imported inflation, which states as follows. First, contrary to the monetarist view, excessive monetary expansion by the central bank is not considered as the only cause of inflation (Pinga and Nelson, 2001). The supporters of the structuralist view of inflation argue that the money stock is 'partly' endogenous and in some situations only plays a passive role in the inflationary process. Second, imported capital and intermediate goods are essential inputs in the production process of developing countries (see Taylor, 1983; Thirlwall, 1974). Third, the ability of developing countries to finance imported goods is constrained by foreign exchange scarcity, due to the fact that many developing countries only export a few primary commodities (or low technology labour intensive products) with relatively low income elasticities in the international markets, while the demand for imports has high income elasticity (Argy, 1970; Ghatak, 1995; Thirlwall, 1974).

Domestic inflation in Albania is fuelled by imported food and energy products, as well as exchange rate fluctuations, as also confirmed by several similar empirical studies done on this topic (Çeliku et al., 2019; Papavangjeli, 2019; Skufi, Kika, 2019; Skufi, Çela, 2017). The behaviour of the agriculture sector is an important driver of inflation in Albania. The agricultural sector contributes

with about 20% to GDP, but yet Albania ensures a considerable share of food domestic demand through imports. Food is an important component of the consumption basket for most of the population, the respective weight of which in the consumer basket is around 42%; therefore, movements in food prices drive overall inflation dynamics. Also, the exposure of agricultural production to weather shocks may generate large and frequent changes in output, and consequently in prices as well. Negative shocks to domestic food production may also induce an increase in food imports, which may exacerbate and prolong the effects of imported inflation to the overall inflation.

Another channel of external pressure on domestic prices is imports of petroleum and related products, which represent about 16 percent of Albania's total imports. Thus, the country is exposed to the international energy prices which pass through the domestic production costs of goods and services, eventually increasing inflation. The exchange rate also plays an important role in any import-dependent economy, as the case of Albania (as shown also in several studies on this topic (Tanku, Vika, 2020; Vika, Rama, 2017). A depreciation of the domestic currency raises the cost of imports, which in turn increases the domestic prices.

MODEL SPECIFICATION AND ESTIMATION PROCEDURE

In this section, we present an empirical model that embeds the different approaches of inflation mentioned above and allows us to test various hypotheses. Following Maweijje and Lwanga (2016 and Durevall (2010), inflation is viewed as mainly originating either from price adjustments in markets with excess demand or supply, or from price adjustments due to import costs. The modelling approach adopted herein accounts for several structural features of the Albanian economy, such as: (i) exposure to agricultural shocks that affect food prices and overall price level; (ii) import dependence and exposure to international prices shocks, particularly cereals, food, and oil prices; and (iii) financial repression arising from direct and indirect financing of the fiscal deficit.

The money market equilibrium, in an open economy, which also considers the role of the exchange rate for portfolio decisions, can be represented by the following expression:

$$(m-p) - \lambda y + \rho r + \gamma e = 0 \qquad (1)$$

where m, p, y, r and e are the annual changes in money stock, price level, output and interest rate, and λ, ρ and e are the elasticities of money demand with respect to output, the interest rate, and the exchange rate, respectively.

Changes in the exchange rate affect the returns on foreign assets and, therefore, their demand relative to domestic assets. In the absence of foreign exchange controls, expected appreciation or depreciation will influence the demand for foreign assets as a substitute for local currency. Therefore, the demand for real balances is influenced by the exchange rate.

The fiscal theory of inflation suggests that the fiscal deficit may affect the price level through its impact on money demand and thus the equilibrium in the money market. In particular, government borrowing to finance the deficit results in monetary expansion, which raises inflation. In line with this theory, the second long-term equilibrium which describes a relationship between inflation and the ratio of the fiscal deficit and real money balances is presented as follows:

$$\frac{M}{p} = \delta_1(G^{prim} - T) + \delta_2 \Delta pubdebt_t \qquad (2)$$

Where the coefficients δ_1 and δ_2 represent the long-run effects of the primary fiscal deficit and public sector borrowing on real money demand.

Next, the 'law of one price' or purchasing power parity is applied for both food and non-food markets, according to which the linkages between the price level and the exchange rate in the long run are reflected in the trend of the real exchange rate or the terms of trade of domestic goods in terms of foreign goods. The equilibrium condition can be expressed as:

$$e + p_f - p = 0 \qquad (3)$$

These co-integration relations are tested and estimated for several CPI (Consumer Price Index) items: all CPI items, food and non-food items and cereals as well, given their considerable share in production, food imports, and food consumption. Further, this study considers the agricultural production gap instead of overall GDP gap as a determinant of inflationary pressures arising from the supply side.

The potential agricultural output is calculated using Hodrick-Prescott (HP) filter using the formula:

$$\min \sum_{t=0}^{T} (y_t - s_t)^2 + \lambda \sum_{t=2}^{T=1} ((s_{t+1} - s_t) - ((s_t - s_{t-1}))^2$$

where λ is the smoothness level of the trend (which is assumed λ = 6400), is the trend component of the agricultural output series and y is the actual agricultural output.

Time series econometric modelling methods are used to estimate four models for each of the inflation measures (cereals, food, non-food, and all-item inflation) through a two-step procedure. The first step establishes long-run relationships in the monetary and fiscal sectors, and in the food and non-food sectors. After specifying and estimating the long-run relationship in each of these sectors, the coefficients of the cointegrating vector are used to compute the deviations from equilibrium.

In the second step of the empirical analysis, ARDL (Auto-regressive distributed lag) models with HAC (heteroscedasticity and autocorrelation consistent) standard errors are estimated for cereals, food, non-food, and CPI inflation, including in the specification the error correction residuals estimated in the first step. Applying the general-to-specific methodology, the analysis starts with over-parameterized models where short-term variables have 4 lags each and then parsimonious models of inflation are derived through a process of model reduction.

Each model groups the inflation determinants into three categories: long-run determinants, short-run domestic factors, and short-run external factors. Long-run determinants are represented by the cointegrating vectors derived in the first step of the analysis. Short-run determinants are lags of first differences of the variables of interest. More specifically, the model incorporates long-run relationships in the monetary sector (equation 1), in the fiscal sector (equation 2), and food and non-food sectors (equation 3), as well as the inertial effects of domestic prices, the short-run effects of agricultural output gap, money growth, public sector borrowing and primary fiscal deficit, the exchange rate, and international prices, as in the specifications below.

The baseline model is defined as follows:

$$\Delta p_t = \theta_0 + \sum_{j=2}^{k} \theta_{1j} \Delta p_{t-j} + \theta_2 agrigap + \sum_{j=2}^{k} \theta_{3j} \Delta m_{t-j} + \sum_{j=2}^{k} \theta_{4j} \Delta p^{w}_{cereals\ t-j} + \sum_{j=2}^{k} \theta_{5j} \Delta er_{t-j} + \theta_6 ECM_m + \theta_7 ECM_{cer} + \theta_8 ECM_{nfood} + \varepsilon_t \qquad (4)$$

As already stated earlier, the baseline model is estimated for four measures of inflation (Δp): cereal $(cerp)$, food (fp), non-food (nfp), and all-item inflation (Δp). The variable $agrigap$ represents the agricultural output gap as a determinant of inflationary pressures arising from the domestic food supply, m is real money stock, Δp^{w} is inflation (including cereal price, food price, non-food price and oil price changes in the global market, introduced in the model according to different model specifications), and er is the exchange rate of ALL (Albanian Lek) to EUR (Euro). The error correction (ECM) terms represent the cointegration equations (disequilibria) for the money market, relative prices for food (cereals), and non-food markets, respectively, estimated in the first step of the procedure. Additionally, in each short-term equation, there are included some dummies catching sharp spikes in world food and cereal prices and in the agricultural output gap that are typically related to shocks to food production, also in order to explain the soaring domestic inflation of the recent period.

The ECM equation for the monetary sector is a modified version of equation (1) that excludes the interest rate and includes the real exchange rate[2]:

$$(m-p) - \lambda y + \gamma e + c = 0 \qquad (5)$$

where the variables are defined as explained above, and c is a constant.

[2] *The interest rate is replaced with the exchange rate in order to link it with the equilibrium relations in the two other markets according to purchasing power parity.*

The respective ECM equations for food and non-food sectors are as below:

$$e + p_f^w - p_f + c = 0 \qquad (5a)$$
$$e + p_{nf}^w - p_{nf} + c = 0 \qquad (5b)$$

The empirical analysis proceeds with the estimation of an alternative specification which includes the fiscal sector, based on the fiscal view of inflation, defined as follows:

$$\Delta p_t = \theta_0 + \sum_{j=2}^{k} \theta_{1j} \Delta p_{t-j} + \theta_2 agrigap + \sum_{j=2}^{k} \theta_{3j} \Delta pub_{t-j} + \sum_{j=2}^{k} \theta_{4j} \Delta p^w_{cereals\ t-j} + \sum_{j=2}^{k} \theta_{5j} \Delta er_{t-j} + \theta_6 ECM_{fiscal} + \theta_7 ECM_{food} + \theta_8 ECM_{nfood} + \varepsilon_t \qquad (6)$$

where pub represents borrowing from the public sector, and ECM_{fiscal} is generated from the long-run equilibrium relation in the fiscal sector, as specified in equation (2), introducing also a constant term.

The individual models for each of the sectors are specified in natural logarithm and all the series result to be integrated of order one, I(1), after being tested for the stationarity properties using the Phillips-Perron unit root test. Next, the variables included in the short-run models are specified in a stationary form, as annual growth rates, or as a relative indicator (expressed in percentage). The sample starts from 2000, due to questionable data quality during the first decade of the transition period.

DATA DESCRIPTION AND EMPIRICAL RESULTS

The dataset includes quarterly data covering the period 2000 Q1-2022 Q1 for several economic indicators: real production, agricultural output gap, price level, exchange rate (ALL/EUR), monetary aggregates, and fiscal indicators such as: primary fiscal balance and public borrowing. Real production growth is represented by the annual growth of GDP at constant prices expressed in million ALL and the price level is measured by several price indexes: cereals, food, non-food, and overall CPI. Money supply growth is represented by the monetary aggregate M3 growth expressed in real terms, deflated by the CPI inflation.

Data on domestic indicators are obtained from Albania's National Institute of Statistics (INSTAT), Bank of Albania (BoA) and Ministry of Finance and Economy (MFE), whereas data on the international prices are taken from World Bank Commodity Price Data (The Pink Sheet). Detailed information on the variables list used in the regressions is provided in Table A1 in the Appendix.

Table 1 summarizes the estimation results of the baseline specification, which confirm that inflation in Albania is determined by several long-term and short-term factors. Monetary sector developments are important long-term drivers of inflation in Albania. As indicated in the estimated cointegration residual equation (the ECM term for the monetary sector), excess money supply growth has a long-term positive impact on the overall price level when controlling for the main factors of money demand, such as GDP and the exchange rate (the latter being a proxy for the opportunity cost of holding liquidity in the domestic currency). More specifically, a 1 percent increase in GDP increases money demand by 0.8 percent, and a 1 percent increase in the real exchange rate contracts money demand by 0.12 percent in the long run. Imbalances in the monetary sector cause inflationary pressure on all the considered price measures: cereals prices, food and non-food prices, and overall prices (all-item CPI), but the effect is statistically significant only for the latter.

Table 1. Baseline specification.

Variables		Cereals	Food	Non-food	Headline
		Adjustment effects			
Monetary sector	$[(m-p) -0.79y+0.12e]_{t-1}$	0.202 (0.106)	0.058 (0.869)	0.035 (0.974)	0.339* (0.091)
Cereals sector	$[(e+ p_f^w)- 0.88p_f - 5.23]_{t-1}$	0.049*** (0.009)	0.051** (0.030)		0.410* (0.095)
Non-food sector	$[(e+ p_{nf}^w) - 0.41p_{nf} -5.79]_{t-1}$			0.034** (0.015)	0.360* (0.079)
		Domestic factors			
Domestic cereal inflation(-1)		0.462*** (0.000)			0.031* (0.062)
Agricultural output gap(-1)		-0.133* (0.093)	-0.049* (0.061)		-0.003* (0.053)
Money growth(-1)		0.026 (0.814)	0.051 (0.874)	0.057 (0.208)	0.021* (0.096)
Domestic food inflation(-1)			0.628*** (0.000)		
Domestic non-food inflation (-1)				0.173* (0.052)	
		External factors			
World cereal inflation		0.211** (0.027)			0.042** (0.024)
World food inflation			0.241** (0.023)		
World non-food inflation				0.003* (0.072)	
Exchange rate change		0.001 (0.106)	0.005 (0.113)	0.017 (0.908)	0.029* (0.059)
World Oil Price					0.001 (0.109)
World food*spike		0.043** (0.016)	0.012** (0.034)		0.014* (0.074)
Constant		0.002 (0.243)	0.004 (0.321)	0.002* (0.067)	0.135*** (0.000)
Obs.		*73*	*73*	*73*	*73*
Adjusted R-squared		0.415	0.497	0.267	0.419

*Note: Estimates are corrected for autocorrelation and heteroskedasticity. *** denotes significance at 1%, ** significance at 5%; * significance at 10%.*
Spike is a dummy variable capturing the "spikes" in the world food prices.

In the long run, international food prices also have a significant effect on domestic prices of cereals and food and on the overall inflation: keeping the exchange rate constant, a 1 percent increase of the food price in the international markets raises the domestic prices of cereals by about 0.9 percent, demonstrating that Albania is integrated in international food markets and it's highly dependent on food imports. Also, non-food prices in Albania are determined by world prices in the long run and more specifically: a 1 percent increase of the international non-food price index raises domestic non-food prices by 0.4 percent.

As regards the short-run period, inflation is driven mainly by structural factors: sporadic food price inflation seems to be influenced more by international prices, and agricultural supply shocks rather than money growth and the exchange rate. Money growth affects positively all price measures, but the effect is statistically significant only for the headline inflation. One important issue in assessing the impact of the money growth on inflation is that its effect can be offset or amplified by variations in exchange rate or aggregate demand. The agricultural output gap results with a negative statistically significant effect on cereal, food and overall inflation, implying that the periods of abrupt deterioration of the agricultural production are associated with inflationary pressures on certain inflation measures. As expected, the impact of the output gap is stronger on cereal prices relative to the other inflation measures. International prices are another very important determinant of domestic prices, and their effect on domestic prices is amplified especially along the periods of sharp price upsurges globally, as the one we are experiencing currently. Nevertheless, a thorough analysis with monthly data could reveal more on this issue.

It is worth pointing out the weaker responsiveness of non-food prices to domestic and external factors that affect other measures of inflation, which can be explained by the fact that the non-food consumption basket comprises several goods with prices that are closely controlled and often directly set by the government, such as fuel. Inflation displays substantial persistence, with past changes in domestic prices leading to high inflation in the current period.

In addition, alternative specifications are estimated for each of the price measures, by substituting the monetary indicators with fiscal ones in the short-term specifications, in order to investigate the inflationary implications of fiscal measures. A 1 percent increase in deficit increases real money stock by 2.2 percent, and a 1 percent increase of public sector debt increases real money stock by 0.68 percent, but the effect of disequilibria in the fiscal sector is not significant on inflation, in the long run.

Table 2. Alternative specification considering the fiscal sector.

Variables		Cereals	Food	Non-food	Headline
		Adjustment effects			
Fiscal sector	$[(m-p) - 2.23*pubdef - 0.68*debt]_{t-1}$	-0.096 (0.363)	-0.066 (0.869)	0.072 (0.454)	-0.009* (0.091)
Cereals sector	$[(e+p_f^w) - 0.88p_f - 5.23]_{t-1}$	0.049*** (0.009)	0.051** (0.030)		0.410* (0.095)
Non-food sector	$[(e+p_{nf}^w) - 0.41p_{nf} - 5.79]_{t-1}$			0.038* (0.093)	0.360* (0.079)
		Domestic factors			
Domestic cereal inflation(-1)		0.527*** (0.000)			0.028* (0.055)
Domestic food inflation (-1)			0.610*** (0.000)		
Domestic non-food inflation (-1)				0.109* (0.057)	
Agricultural output gap (-1)		-0.101* (0.091)	-0.081* (0.061)		-0.005* (0.087)
Public sector borrowing		0.001 (0.814)	0.010 (0.602)	0.0002 (0.208)	0.014* (0.095)
		External factors			
World cereal inflation		0.039** (0.043)			0.011** (0.042)
World food inflation			0.049** (0.013)		
World non-food inflation				0.034* (0.077)	
World Oil Price					0.0007* (0.059)
World food*spike		0.035** (0.025)	0.015** (0.037)		0.028* (0.082)
Constant		0.001 (0.784)	0.004 (0.321)	0.003 (0.893)	0.012*** (0.000)
Obs.		67	67	67	67
Adjusted R-squared		0.351	0.508	0.143	0.546

*Note: Estimates are corrected for autocorrelation and heteroskedasticity. *** denotes significance at 1%, ** significance at 5%; * significance at 10%.*
Spike is a dummy variable capturing the "spikes" in the world food prices.

In the short run, an increase in the public sector borrowing leads to an increase of all inflation measures, but the effect results statistically significant only for headline inflation, even though the effects are negligible. This can be explained by the fact that the fiscal deficit in Albania is financed mostly by bonds and external borrowing, rather than money issuance.

The results for the other determinants are roughly similar to those found in the baseline model. External factors play an important role in fuelling domestic inflation, particularly through imported food and energy products as well as exchange rate fluctuations. The results show persistent effects of shocks to world prices on several measures of domestic inflation. Inflation exhibits inertia, with price shocks leading to high inflation, especially in the cases of food and cereals inflation. Non-food inflation displays a smoother pattern and is not affected by either money growth or public sector borrowing, which could be due to the fact that this indicator includes items for which prices are controlled or closely monitored, such as fuel and energy.

5. FINAL REMARKS

While the findings are generally in line with the existing studies' results, this article accentuates the critical importance of considering structural supply-side factors to understand the dynamics of inflation, especially food sector developments in general and those in the cereals sector in particular. In the short run, shocks to cereal production trigger cereal and food price hikes, with spillover effects on the overall inflation. In the long run, disequilibria in relative cereal prices in Albania versus world markets sustain inflation in the country. These results reflect the large share of cereals in household consumption, exposure of cereal production to natural shocks, and dependence on imported cereals. The fiscal sector, which has been omitted in previous studies, has both long-run and short-run impacts on inflation in Albania, even though the effects are minor at the moment.

The results from this study confirm that the Albanian economy is significantly integrated in the global economy. Its prices are strongly influenced by relative prices in the cereal and food sector in the long run, and changes in world prices of grains, food, non-food items are transmitted into domestic prices.

As regards policy implications, the empirical results of this study suggest intervention by easing supply-side constraints and stabilizing cereal production in line with the needs of the fluctuating demand, arising from the fast changing population and urbanization trends. Additionally, keeping money growth under control is desirable to avoid exacerbating other pressures on inflation from the demand and supply sides. Even though the analysis herein show that the current effects are negligible, containing government borrowing should be part of the inflation-controlling strategy, in order to prevent any adverse effect in the future. However, the government borrowing implications for inflation are complex, as they work through both the demand and supply sides. For instance, when government debt is used to finance public investments that boost productivity and expand the economy's productive capacity, such as infrastructure, technology, and innovation, the supply-side effects may eventually ease demand-side inflationary pressures. This certainly would require an effective coordination of monetary and fiscal policies, as well as rationalization and efficient management of debt-funded government expenditures.

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APPENDIX

Table A1. Variables' description.

Indicator	Variable name	Source
Headline inflation	Δp	INSTAT
Cereal inflation	$\Delta p^{cereals}$	INSTAT, author's calculations
Food inflation	Δp_{food}	INSTAT
Non-food inflation	Δp_{nfood}	INSTAT, author's calculations
Agricultural output gap	$agrigap$	INSTAT, author's calculations
Money growth	Δm	Bank of Albania
Public sector borrowing	Δpub	Ministry of Finance and Economy
Primary deficit	$\Delta prim$	Ministry of Finance and Economy, author's calculations
World cereal price	$\Delta p^{w}_{cereals}$	World Bank Commodity Price Data (The Pink Sheet)
World food price	Δp^{w}_{food}	World Bank Commodity Price Data (The Pink Sheet)
World non-food price	Δp^{w}_{nfood}	World Bank Commodity Price Data (The Pink Sheet), author's calculations
Oil price	Δp^{w}_{oil}	World Bank Commodity Price Data (The Pink Sheet)
Exchange rate (ALL/EUR)	Δer	Bank of Albania for the nominal exchange rate (ALL/EUR), INSTAT for domestic inflation, EUROSTAT for inflation in Euro Area, and author's calculations

Table A2. Stationarity test results.
H0: The variable has a unit root.

	Unit Root Test Results (p-value)	
Variable	Level	First difference
Money supply	0.939	0.0001***
GDP	0.113	0.0001***
Exchange rate (ALL/EUR)	0.969	0.0018***
Public debt	0.801	0.0001***
Primary fiscal deficit	0.069	0.0000***
Domestic food price	0.853	0.0001***
Domestic non-food price	0.762	0.0000***
World food price	0.756	0.0000***
World non-food price	0.671	0.0000***

** Null hypothesis rejected on 10% level of significance; ** Null hypothesis rejected on 5% level of significance; *** Null hypothesis rejected on 1% level of significance.*

Table A3. Co-integration test results.

	Data trend	None	None	Linear	Linear	Quadratic
	Test type	No Intercept No Trend	No Intercept No Trend	No Intercept No Trend	Intercept Trend	Intercept Trend
Monetary sector	Trace	1	1	1	2	3
	Max-Eigen	1	1	1	1	1
Food sector	Trace	1	1	0	0	0
	Max-Eigen	1	1	0	0	0
Non-food sector	Trace	1	0	1	0	2
	Max-Eigen	1	0	1	1	2

CLIMATE RISK MANAGEMENT AND BANKS IN ALBANIA

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INTRODUCTION

Physical materialisations of climate changes are becoming increasingly visible across the globe, as well as their social and economic impacts. Both these impacts will continue to increase in a non-linear way, until the world transitions to a net-zero emission and adapts to such changes. Thanks to numerous studies on climate science, climate changes are no longer perceived as related only to global worming, but rather as a combination of several factors (in addition to the greenhouse effect, carbon emission from economic activity is considered as another effect) resulting in the already proven fact that our planet is warming beyond a safe global warming level.

Climate change cause large-scale changes of the planet's key eco-systems. Unfortunately, such changes are non-linear. To raise the awareness and make climate risk more tangible, the climate science has proven through specific examples for each ecosystem the threat from climate change. For example, in the event of a global warming under 2 degrees Celsius, compared to 1.5 degrees Celsius, coral reefs would disappear and nearly 37% of the world's population would be exposed to extreme heat every five years.[2] Changes like these in eco-systems could make our planet uninhbitable. (World Bank 2020).[3]

The need for a global response has been materialised in initiatives and alliances for action towards urgent improvment of such effects and ensuring a safe planet for the continuity of life in it. The Paris Agreement 2015[4], signed by 197 parties (UN members) has served as as catalyst for such actions. The aim is "to strengthen the global response to the threat of climate change, ... holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C"[5](UNFCCC 2020). Each country is supposed to present

[1] *I am grateful to Mr Kliti Ceca for his valuable comments and suggestions.*

[2] *Timothy M. Lenton, Hermann Held, Elmar Kriegler, , Jim W. Hall, Wolfgang Lucht, Stefan Rahmstorf "Tipping elements in the Earth's climate system https://www.pnas.org/doi/10.1073/pnas.0705414105*

[3] *World Bank. 2020. "Reversals of Fortune." Poverty and Shared Prosperity report, Washington D.C.*
World Ocean Review. 2020. Fisheries. Accessed April 10, 2020. https://worldoceanreview.com/en/wor-1/fisheries/fisheries-management/

[4] *Details of pledges vary. The updated list of the "Climate Ambition Alliance: Net Zero 2050" may be found athttps://climateaction.unfccc.int/views/cooperative-initiative-details.html?id=94.*

[5] *UNFCCC. 2020. "Paris Agreement." United Nations Framework Convention on Climate Change. Accessed March 10, 2020. https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement.*

its plan of efforts to mitigate and adapt the so-called nationally determined contribution (NDCs)[6], and a specialised UN agency (the UNFCCC secretariat) is responsible for monitoring the process. Albania signed the Paris Agreement in December 2017 and its Parliament has adopted the 2030 agenda with its commitments for sustainable development. In January 2019, Albania ratified the Kigali Amendment to the Montreal Protocol[7]. The Agreement aims to reduce the use of hydrofluorocarbons (HFCs), the emissions of powerful greenhouse gases that are primarily used in air conditioning, refrigeration and heat pump equipment, and can be thousands of times more potent than carbon dioxide in contributing to climate change. The legal and guiding framework, including the national strategy on sustainable development and the plan of measures is in force.

Thanks to the awareness of the threat of climate change, in December 2017, the "Supervisors Network for Greening the Financial System (NGFS)"[8] was set up by a group of Central Banks and Supervisors willing to contribute to the development of the environment and climate risk management in the financial sector, and to mobilise mainstream finance to support the transition toward a sustainable economy. The NGFS has acknowledged that "climate-related risks are a source of financial risk and it, therefore, falls squarely within the mandates of central banks and supervisors to ensure the financial system is resilient to these risks" (NGFS (2018)). The NGFS has published guidelines for methodologies and contributes continuously by sharing best practices in the management of environmental and climate-related risks to the financial sector. To learn more and contribute to global efforts for a greater role of the financial sector in managing climate-related risks, the Bank of Albania joined the Network for Greening the Financial System (NGFS) as a member central bank in 2022[9] (Sejko 2022). The Bank of Albania will benefit from the NGFS membership learning from the experience of other member central banks and will contribute to global efforts for green finance, and in a broader context, to a sustainable environmental development.

CHALLENGES TO CREATING A MODEL ON CLIMATE-RELATED RISKS

Based on the methodologies published by the NGFS, the Bank of Albania is not only promoting the awareness of a need for actions related to climate change but also studying and evaluating the potential effect of climate-related risks to the economy in general and financial stability in particular.

The assessment of effects from climate-related risks to the economy is a very complex exercise. Direct risks from climate-related risks are determined by the severity and frequency of the climate risk. Exposure to such risks affects all sources and capitals of the economy, including human and financial capital, as well as natural capital.

[6] *Third National Communication of the Republic of Albania under the United Nations Framework Convention on Climate Change Tirana, June 2016*
[7] *https://www.unido.org/news/albania-steps-fight-against-climate-change*
[8] *https://www.ngfs.ne*
[9] *https://www.bankofalbania.org/Botime/Botime_te_vecanta/Banka_qendrore_dhe_politikat_e_saj_ne_kohen_e_Covid-19_Sfidat_per_te_ardhmen.html p. 234*

The literature review shows that the insofar models have seen natural ecosystems as valuable assets for immediate use rather than core capital that enables the continuation of human existence. Natural capital is complex to value and difficult to measure using the economic concept alone. Financial markets do not recognise the value of natural capital unless they have a determined monetary value stemming from it or a valuation as an asset that may be measured by the current economic models. As a result, the true value of use and the real costs of destruction of these natural systems have been underestimated[10] (Defries et al 2019). Natural capital is different from other forms of capital; it does not amortise, as it has a self-regenerating capability. But, when the abuse of a certain ecosystem reaches a point where self-generation is lost, then the collapse of the ecosystem is irreversible[11]. For an adequate assessment of nature, we need to include climate science in our economic models, by the definition that it provides to the turning points and the specificities of ecosystems. Recently, researchers are following this approach and, together with climate science, they have made assessments such as nearly USD 44 trillion in the global GDP is dependent on nature and the services it provides[12].

There are three main types of climate-related risks: physical risks, transition risks, and legal risks (Carney 2015)[13]. Physical risks arise from climate risks and long-term changes in climate models. Transition risks arise from the process of structural changes that is necessary for a transition toward a low-carbon economy, including changes to climate-related policies, technologies and consumer behaviour and investor preferences.

Combinations of potential physical risks from climate threats come from all the sectors of the economy: construction, agriculture, finance, fisheries, tourism, manufacturing, real estate and infrastructure. To assess potential impacts of climate-related risks on the economy, variables including the entire spectrum of "inputs" and "outputs" need to be included for each sector, such as risk to life and incapacity to work, as well as a shortage of food supply and physical damage to assets and infrastructure. Moreover, their transmission channels to the economy should be viewed as direct and indirect ones. The range of variables increases as, besides direct risks, there are also transition risks which require costs and structural interventions in key sectors of the economy. A complex interaction of variables (micro and macroeconomic variables with social variables and natural ecosystem variables) renders difficult any modelling of the effects from climate-related risks to the economy.
In the meantime, any delay by the banking sector for actions to tackle climate risks would have irreparable costs. Banks are being, therefore, increasingly encouraged to manage climate risks, while not yet under regulatory pressure

[10] *DeFries, R., O. Edenhofer, et al (2019): The Missing Economic Risks in Assessments of Climate Change Impacts. Grantham Research Institute on Climate Change and the Environment,*

[11] *C. Herweijer et al. (2020), Nature Risk Rising: Why the Crisis Engulfing Nature Matters for Business and the Economy, World Economic Forum, http://www3.weforum.org/docs/WEF_New_Nature_Economy_Report_2020.pdf.*

[12] *C. Herweijer et al. (2020), Nature Risk Rising: Why the Crisis Engulfing Nature Matters for Business and the Economy, World Economic Forum, http://www3.weforum.org/docs/WEF_New_Nature_Economy_Report_2020.pdf.*

[13] *https://www.bankofengland.co.uk/speech/2015/breaking-the-tragedy-of-the-horizon-climate-change-and-financial-stability*

to comply. Financing of a green agenda has began to appear in banks's logos and has become part of bank lending agenda[14]. Some large banking groups in Europe, following a study of plans for de-carbonising the respective economies and projection of needs for adapting the sectors toward net-zero carbon emission economies, have made important strategic decisions promoting sustainable finance, providing incentives and preferential rates for green loans and mobilising new capital for environmental initiatives. It is imperative now to have strong and determined actions, in order for the effective climate-related risk management to become an established capability among banks.

As part of a constant research efforts, this paper aims to bring to the attention of banks in Albania the need to consider climate-related risks in their risk management framework and policies. Banks will have to set up a new structure and build capacities for climate risk management. In the absence of available data for each sector of the economy or a roadmap of steps towards reaching the 1.5 Celsius degree objective, this is not an easy task. In addition to drawing the attention of banks on climate-related risks, we try to simplify the complexity of a model and describe analytically the situation of climate-related risks in Albania and the degree of the potential exposure of the Albanian economy to climate change.

FINANCING ENVIRONMENTAL POLICIES

The role of finance in climate change policies is emphasised in Article 2 of the Paris Agreement, which calls for "making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development. (UNFCCC 2020)[15].

From an economics perspective, natural ecosystems are in essence the core natural capital16 (similar to financial or human capital) that ensures continuity of services. Such "ecosystem services", which economic systems and models often take for granted, include:]

1) Fertile land and pollination that enable agricultural production, i.e. food. A recent research shows that the the worldwide loss of all pollinators would lead to a drop in annual agricultural output of about US$ 217 billion[17];
2) Forests that pull out carbon from polluted air in industrial centres that

[14] *IMF. 2020a. "Global Financial Stability Report No. 2020/001." Independent Experts Group on Climate Finance. 2020. "Delivering on the $100 Billion Climate Finance Commitment and Transforming Climate Finance."*

[15] *UNFCCC 2020. https://unfccc.int/https://unfccc.int/documents*

[16] *The concept of natural capital is determined by the "Natural Capital Committee" https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/516707/ncc-state-natural-capital-first-report.pdf*

[17] *Helmholtz Association of German Research Centres (2008, September 15), Economic Value of Insect Pollination Worldwide Estimated at U.S. $217 Billion. ScienceDaily. Retrieved March 1, 2011, from http://www.sciencedaily.com/releases/2008/09/080915122725.htm*

produce machineries, i.e.enable oxygen. A recent research on climate science has estimated that: for an amount of up to USD 600 per CO2 ton cleaned from the air, it would imply a monetary value for forests in their role as carbon absorbers of more than USD 100 trillion[18];

3) Rivers and basins that clean waters and provide drinking water supply for humans
4) The genetic plant biodiversity, which contributs to the production of pharmaceutical items necessary for our health. It is estimated that more than 1/3 of pharmaceuticals we use are dependant on the plant biodiversity.[19]

While economists, in cooperation with the climate science will work for an appropriate evaluation of nature in economic models, an emergent need is the investment in preventing the degradation of damaged ecosystems, in regenerating natural ecosystems and in protecting those that have managed to self-regenerate.

For the purpose of research and in light of the impact on the financial system, the NGFS has specified climate-related risks into 2 large categories: environmental risks and climate-change risks. Environmental risks refer to risks posed by the exposure of the financial system to activities that may potentially cause or be affected by environmental degradation (of the ecosystems mentioned above,(such as air and water pollution, land contamination, deforestation and reduced biodiversity). Climate-related risks refer to risks posed by the exposure of the financial sector to physical or transition risks caused by or related to climate change (such as damage caused by extreme weather events or a decline of asset value in carbon-intensive sectors).

Similarly to the NGFS, it is important for Albania to focus on climate-related risks rather than on environmental risks, for two reasons: first, the transition to a low-carbon economy consistent with the objectives of the Paris Agreement requires a radical shift of resource allocation and, thus, a seminal response by the financial sector. Second, in the map of risks, Albania is more exposed to climate-related risk than environmental risks[20].

The G20 Green Finance Study Group (GFSG, 2016) defines for the first time "green finance" as "financing of investments that provide environmental benefits in the broader context of environmentally sustainable development"[21]. Globally, demand for green financial services has increased significantly as part of the transition toward a net-zero carbon economy. For example, a study by McKinesey on the European towards the adaptation to an "under a 1.5°C pathway, "the number of solar panels installed globally per week would be

[18] *C. Herweijer et al. (2020), Nature Risk Rising: Why the Crisis Engulfing Nature Matters for Business and the Economy, World Economic Forum, http://www3.weforum.org/docs/WEF_New_Nature_Economy_Report_2020.pdf*

[19] *D. J. Newman and G. M. Cragg, Natural products as sources of new drugs over the 30 years from 1981 to 2010. J Nat Prod. 2012;75(3):311–335. doi:10.1021/ np200906s*

[20] *Third National Communication of the Republic of Albania under the United Nations Framework Convention on Climate Change Tirana, June 2016.*

[21] *Green Finance and the Resilience of the Financial Sector to Climate Change.*

approximately eight times more than what occurs today, while the rate of wind-turbine installations would increase fivefold".[22] Investment in renewable energy, renewable energy plants or adaptive technologies require substantial funding. In addition to improvements in terms of carbon emission, such investments should be viewed also as a profitable opportunity for banks. Oil and gas, electrical energy production, real estate, transport industry, electrical vehicles, and agriculture represent great opportunities for green investments.

While transition would create development opportunities, companies that generate or operate under high emissions (carbon dioxide CO2, methane CH4, nitrous oxide N2O), mainly in the energy and transport sectors, exctractive, processing and chemical industries, in livestock and agriculture cultivation) will face challenges related to demand-side effects, production costs, and employment.

Given that tangible effect and the return of such investments is long term and often beyond traditional long-term credit maturities, it is difficult for banks to find the right incentives and assess positive comprehensive effects of such investments and the catastrophic effects from the lack thereof.

The European Central Bank published on 22 September 2021 the results of the climate change stress-test exercise for 1600 banks of the euro area[23]. Stress-test findings showed that:

- Banks to be severely affected if climate change issues not addressed
- Orderly and swift transition to minimise costs and maximise benefits outweighs short-term cost of transition to zero-carbon economy over medium to longer term
- Investment in sectors and regions heavily exposed to climate risk set to suffer most

The results show that firms and banks clearly benefit from adopting green policies early on to foster the transition to a zero-carbon economy. The exercise also reveals that the impact of climate risk is concentrated in certain regions and sectors of the euro area. In particular, firms located in regions most exposed to physical risk could face very severe and frequent natural disasters, which would in turn affect their creditworthiness.

Challenges of climate-related risks require banks to identify, assess and monitor the climate-related risk exposure for their current portfolio and review their crediting policies and indicators for any future lending. A database on physical risks and transition risks for each sector of the economy would help banks to clearly understand the size of physical risks and the transmission channels of such risks to financial ones. Having strategies and action plans in place for adopting and minimising climate-related risks for each sector of

[22] *How the European Union could achieve net-zero emissions at net-zero cost," McKinsey & Company, December 2020. Paolo d'Aprile, Hauke Engel, Godart van Gendt, Stefan Helmcke, Solveigh Hieronimus, Tomas Nauclér, Dickon Pinner, Daan Walter, and Maaike Witteveen.*

[23] *https://www.ecb.europa.eu/pub/pdf/scpops/ecb.op281~05a7735b1c.en.pdf*

the economy by the government helps banks to model transition models and their underlying costs and to plan future crediting toward environment-friendly projects.

In the absence of "climate-related risk mapping", we are trying to rely on various research sources to identify the potential risks facing Albania and vulnerable sectors to climate-related risks, in the hope that banks will create their own map of exposures to climate-related risks, both for physical and transition risks by identifying their exposure to those sectors contributing the most to the de-carbonisation process.

WHAT DO WE KNOW ABUT ALBANIA'S EXPOSURE TO CLIMATE-RELATED RISKS?

FROM PHYSICAL CLIMATE-RELATED RISK TO FINANCIAL CLIMATE-RELATED RISK

As average temperatures rise, physical risks such as heat waves and floods grow in frequency and severity, and chronic hazards, such as drought and rising sea levels, intensify. Stabilising the climate and contain physical risks will require reduction in greenhouse gas emissions (carbon dioxide CO2, methane CH4, nitrous oxide N2O), reaching net-zero CO2 emissions, and limiting global warming to 1.5°C to pre-industrial levels in order to reduce dangerous and irreversible consequences from climate changes[24].

The Action Plan of the Government of Albania, in line with the commitment under the Paris Agreement, was published in 2016 in the official website of the Ministry of Environment[25] and on the UN site on climate change[26].

This plan is organised by sector[27] and commitments are made based on 2009 data. Albania's climate risk country profile appears also in World Bank Group research. This profile is part of a series of Climate Risk Country Profiles developed by the World Bank Group (WBG) on the climate risk, designed as a quick reference source to better integrate climate resilience in development planning and policy making. Data, however, are from the publication of the Ministry of Environment in 2016. More data may be found from climate study centres focusing on the region.

[24] *Summary for policymakers," in Climate change 2021: The physical science basis: Contribution of Working Group I to the Sixth Assessment Report, IPCC, 2021.7*

[25] *https://turizmi.gov.al/wp-content/uploads/2021/10/6.-Komunikimi-i-Tret%C3%AB-Komb%C3%ABtar-i-Republik%C3%ABs-s%C3%AB-Shqip%C3%ABris%C3%AB-drejtuar-Konvent%C3%ABs-Kuad%C3%ABr-t%C3%AB-Kombeve-t%C3%AB-Bashkuara-mbi-Ndryshimet-Klimatike_Qershor-2016.pdf*

[26] *Third National Communication of the Republic of Albania under the United Nations Framework Convention on Climate Change. URL: https://unfccc.int/sites/default/files/resource/Albania%20NC3_13%20October%202016.pdf*

[27] *Data are not updated.*

CLIMATE-RELATED PHYSICAL RISKS

Physical risks include economic costs and financial losses resulting from the increasing severity and frequency of extreme climate change-related weather events (such as heatwaves, landslides, floods, wildfires and storms) and longer-term progressive shifts of the climate (such as changes in precipitation, extreme weather variability, rising sea levels and average temperatures).

ALBANIA IS THE MOST VULNERABLE COUNTRY IN EUROPE PRONE TO VARIOUS RISKS[28].

The Centro Internazionale in Monitoraggio Ambientale (CIMA) and the United Nations Office for Disaster Risk Reduction (UNDRR) have conducted research based on past data related to disasters in Albani in the period 1851-2013. The report[29], provides interesting information on the the likelihood and consequences of hazardous events.

Seven types of disasters taken into account in the report include:

- Geophysical: earthquake, avalanche and sedimentation;
- Meteorological: snowstorm, rain, storm, windstorm, hailstorm, thunderstorm, fog, cold wave, heat wave and frost;
- Hydrological: flood, flash flood and surge;
- Landslides: dry and wet mass movement;
- Climatological: forest fire and drought;
- Biological: epidemic and plague;
- Technological: leak, structure, contamination, explosions, accident and fire;

Information from EM-DAT for the period 1967 - 2018

Event	Occurred (number of times the event has occurred)	Consequences (in affected individuals)
Droughts and fires	2	3,200,000
Earthquakes	6	8,429
Epidemics	2	292
Extreme temperatures	5	237,235
Floods	15	205,584
Landslides	1	26
Storms	2	525,000

Source: https://www.desinventar.net/DesInventar/profiletab.jsp

An example of this type of risk that reveals that the devastating effect of a natural disaster such as an earthquake, is the 2019 earthquake that hit Albania. Its magnitude was the highest recorded in the last 30 years. It resulted in great damages and losses, amounting to ALL 121.21 billion (USD 1.1 billion) in 11 municipalities, including capital Tirana (ALL 35 billion or USD 318 million) and Durres, a main tourist destination (ALL 37.4 billion, or USD 340 million).

[28] *https://www.financialprotectionforum.org/publication/disaster-risk-finance-diagnostic-albania*
[29] *https://www.gfdrr.org/Albania*

According to the PDNA, for the Durres-Mamurras area, the earthquake is estimated to have caused effects that are equivalent to 6.4% of the 2018 Gross Domestic Product (GDP) in damages and to 1.1% of GDP in losses30. In terms of losses, the hardest-hit economic sectors were tourism and real estate, but significant damages were also inflicted on education, health, public infrastructure, manufacturing and trade, and agriculture.

Albania consists of several climate zones, ranging from lowlands and coastal fields in the west, to mountains in the north, east and south. Albania has a subtropical Mediterranean climate, which involves hot and dry summers and mild and humid winters, with a high risk of river floods resulting from rainfall or melting snow. Floods are more frequent and typical during the period November-March. For example, the catastrophic flood in Albania in December 2017 resulted in 1,575 persons evacuated, 3,500 houses were flooded, 65 bridges collapsed, and 56 public schools were damaged, while 15,000 hectares of land was brought under water[31].

As a result of climate changes, by 2050, temperatures in Albania are expected to rise 2,4°C to 3,1°C (USAID 2016)[32] and volatile precipitations. Historical climate trends since the 1960s have shown an increase in annual mean temperatures by 1°C and a further increasing trend is expected to continue (USAID 2016). Climate change may lead to increased frequency and severity of extreme weather events.

A study with latest data has been conducted by the McKinsey research on [33]"A Mediterranean basin without a Mediterranean climate?". The study addresses a number of countries, including Albania.

As the Mediterranean becomes warmer and drier, the risk of water supply shortage, the risk of massive fires and coastal floods increases.

The study points out that:

Climate projections indicate that the number of days with a maximum temperature above 37 degrees will increase everywhere in the Mediterranean region, with a doubling in northern Africa, southern Spain, and Turkey from 30 to 60 by 2050.

Drought: In all the counttries, rainfall during the warm, dry season of April through September is projected to decrease by as much as 10 percent by 2030 and as much as 20 percent by 2050. By 2050, drought conditions could prevail for at least six months out of every year in these areas. As a

[30] *Post-Disaster Needs Assessment - United Nations in Albania https://albania.un.org/en/46378-albania-post-disaster-needs-assessment-pdna-volume-report-february-2020*

[31] *Emergency plan for action, Albania floods, www.Ifrc.org*

[32] *USAID 2016 https://www.usaid.gov/documents/1867/resilience-usaid-2016-progress-report*

[33] *https://www.mckinsey.com/business-functions/sustainability/our-insights/a-mediterranean-basin-without-a-mediterranean-climate*

result, the shortage of water will become stressing. Water stress: Many basins could see a decline of approximately 10 percent in water supplies by 2030 and of up to 25 percent by 2050.

Wildfires: Increased levels of heat and dryness are projected to cause larger areas—up to double the current areas on the Iberian Peninsula—to burn from wildfires.

Disease: High summer temperatures have also been linked with the increasing incidence of West Nile fever in Europe. The summer of 2019 saw the first reported case of West Nile virus infection as far north as Germany. Researchers have already projected that the West Nile virus is likely to spread by 2025 and to spread further by 2050.

Banks are expected to take into account such climate changes and assess the effects of a prolonged drought in their portfolios.

The prolonged drought in Albania is related to the performance of such sectors as energy and agriculture. Agricultural production relies on irrigation, and the reduction of these supplies would reduce the hydro-energetic capacities for the production and transmission of electrical energy. Higher temperatures would lower the output of typical agricultural products such as olives, tomatoes and grapes, both for domestic consumption and exports. As a result, the rural population, which sustains its welfare by revenues from agricultural products, will generate less income. Thus, climate change will affect disproportionally the welfare of this category of the population, because they have less resources, including savings, and often do not have access to the financial system.

According to the McKinsey study on"A Mediterranean basin without a Mediterranean climate?"34, climate change for the Mediterranean Region is expected to disrupt vital industries such as tourism, which today accounts for approximately 15 percent of the GDP of Mediterranean countries.

What would be the effect from structural changes in tourism on banks' portfolios?

In Albania, summer tourism is concentrated mainly along the coastal beaches. The level of the Adriatic Sea has risen on average around 15 cm during the past centuries, resulting in an advancement of the sear towards the coastline for each cm of the average rising sea level. In addition, the active erosion caused by abusive human interventions in the management of river deltas, in Albania, hundreds of square meters disappear and hundreds of pine tries either decay or are destroyed. Projections suggest that:

[34] *https://www.mckinsey.com/business-functions/sustainability/our-insights/a-mediterranean-basin-without-a-mediterranean-climate*

- by 2030, Patoku beach is expected to totally disappear while Kune and Seman beaches will only partially remain;
- by 2050 most parts of Kune and Seman beach is expected to disappear.[35]

The study on the Mediterranean Basin finds that while climate change has not yet caused structural shifts in Mediterranean tourism flows, anecdotal examples show tourists reacting to the changing climate. For example, northern European destinations such as Denmark have become more popular with Belgian and Dutch tourists, who may avoid the hot summers in southern Europe and take advantage of warmer summers in northern Europe.

In southern Europe, heat waves can keep tourists from the beach. This happened in Portugal during the summer of 2018, when temperatures in Lisbon exceeded 40 degrees and news articles reported beach temperatures of 30 degrees at 8 a.m.

Temperatures will likely continue to rise throughout the Southeaster Europe and Albania is expected to experience higher temperatures, rising between 2,4°C and 3,1°C in the period June-August. Seasonal changes in temperatures in Albania may see an extension of the shoulder season by 37 to 22 days from north to south.

Physical risks resulting from climate change, especially from extreme weather have a direct effect on the economy, damaging the private and public infrastructure, and lowering the value of assets and reducing productivity. Such events may disrupt productive and trade activities, causing a shortage of supplies. Recovery would require the use of capital for reconstruction and replacement. As a result, any damage caused transforms into financial risks for banks if they are exposed.

Spillover effects and the connection between the banking system and the macro economy may exacerbate these effects and risks. For example, the deterioration of assets placed as collateral may create loss for banks, which, in turn, may lead to less crediting in certain regions, thus reducing the much needed financing for reconstruction in the affected areas. At the same time, such losses may deplete the household wealth and may, in turn, lead to reduced consumption.

Banks should map the sectors that are vulnerable to climate change, both for physical and transition risks. The map of physical risks should show the exposure of firms that have received bank loans by geography of the firm and the pledged collateral in areas more prone to floods, fires or earthquakes. Banks should identify exposures in their portfolios to the physical risk most likely to occur in Albania, in order to measure the vulnerability and adapt to potential losses.

[35] *https://turizmi.gov.al/wp-content/uploads/2021/10/6.-Komunikimi-i-Tret%C3%AB-Komb%C3%ABtar-i-Republik%C3%ABs-s%C3%AB-Shqip%C3%ABris%C3%AB-drejtuar-Konvent%C3%ABs-Kuad%C3%ABr-t%C3%AB-Kombeve-t%C3%AB-Bashkuara-mbi-Ndryshimet-Klimatike_Qershor-2016.pdf*

CLIMATE TRANSITION RISKS AND THE NEED FOR A MAP OF FINANCIAL EXPOSURES RELATED TO THE CLIMATE RISKS.

Transition risks are related to the process of adaptation toward a low-carbon economy. The process of decarbonized is likely to have significant impacts on all sectors of the economy and financially affecting the values of assets. While emission reduction measures are needed, a legally enforced activity ban, as an unanticipated economic transition, could also have an impact on the financial stability of a particular sector or even the wider economy. The degree of structural and financial economic transformation of this transition is very significant, bringing at the same time risks and opportunities for the banking system and the real sectors of the economy.

The latest official data for Albania, analyzed to understand greenhouse gas emissions[36] are from 2009. In the government statement which includes the commitments made to adapt and minimize the risks of climate change are measured and evaluated direct emissions of greenhouse gases (GHG) as well as indirect emissions.

ALBANIAN EMISSIONS IN CONTEXT

The main contributor to direct GHG emissions is the energy sector, which represents 52.28% of the total, followed by Agriculture (15.83%), Industry (12.61%), Land use and forests (11.91%).) and Waste (7.37%). It is important to note that emissions from the land use and forestry sector are declining significantly towards 2008-2009, while the industrial processes sector is increasing its emissions.

CO2 emissions from the energy sector accounted for 97.07% of total emissions in 2005.

The transport sub-sector contributed 45.06% of total CO2 emissions in 2005 and road transport is by far the main contributor.

INDIRECT GHG (GG) EMISSIONS

About 94.65% of CH4 gases are emitted by the livestock sector during enteric fermentation and manure management.

N2O emissions are mainly produced by the application of nitric fertilizers. CH4 and N2O emissions as a result of agricultural waste incineration are negligible.

[36] *Definition: https://www.britannica.com/science/greenhouse-gas"greenhouse gas, any gas that has the property of absorbing infrared radiation (net heat energy) emitted from Earth's surface and reradiating it back to Earth's surface, thus contributing to the greenhouse effect. Carbon dioxide, methane, and water vapour are most important greenhouse gases".*

Agricultural activities, such as crop cultivation and livestock for food, contribute to emissions. There are a large number of activities that can contribute to N2O emissions from agricultural land, which range from fertilizer application to irrigation and tillage methods.

In the absence of the latest official data for Albania to understand trends and emissions by sectors, we are referring to data from the EU. McKinsey & company's study "The net-zero transition what it would cost and what it could bring"[37] clearly and in detail describes the key sectors that require adaptation and restructuring with the aim of reducing emissions.

The following table is from Mckinsey & company's study "The net-zero transition what it would cost and what it could bring" pg 10.

Përqindjet e emisionit të Co2, 2019, %						
CO2 emision	Power	Industry	Mobility	Buildings	Agriculture	Forestry
	30	30	19	6	1	14

Përqindjet sipas nënsektorëve, %						
Co2 emision, 2019	Power	Industry	Mobility	Buildings	Agriculture	Forestry
	Electricity 97	Steel 26	Road 75	Residential 70	Farming 96	Fostery 100
	Heat 3	Cement 20	Aviation 13	Commercial 30	Fishing 4	
		Oil and gas extraction 15	Maritime 11			
			Rail 1			
		Chemicals 12				
		Coal 6				
		Other 20				

CH4 Methane emisionne %	Industry	Agriculture	Forestry	Waste
	33	38	5	23

N20 Nitrous oxide emmision %	Agriculture	Industry	Power	Forestry	Waste	Mobility
	79	8	3	5	3	2

The above data show us that energy and industry are the main sectors of CO2 emissions and together these sectors generate 60% of CO2 emissions.

The focus of transition risk management as shown by the 2019 data should be:

- Adaptation of energy sectors that contributes to 30% of CO2 emissions in the EU (electricity and heating).

[37] *https://www.mckinsey.com/business-functions/sustainability/our-insights/the-net-zero-transition-what-it-would-cost-what-it-could-bring*

- Adaptation of industry and sub-sectors with high emissions (processing industry mainly production of cement, production of steel and chemicals as well as extractive industry).
- Adaptation of the transport sector that contributes with 19% of CO2 emissions and mainly road transport which generates 75% of the sector emissions.
- Adaptation of the agricultural sector towards the reduction of methane (CH4) and nitrous oxide (N2O) emissions for which this sector is the main generator.

In the EU project for the Western Balkans (pre-accession instrument), one sector where restructuring is required is the construction sector. This sector is estimated to consume over 40% of total energy consumption in the Western Balkans. Renovation of public and private buildings to meet efeciency energy performance standards can make a significant contribution to reducing greenhouse gas emissions and the European Commission has extended the "EU renovation wave"[38] plan for the Western Balkans.

STRATEGYS AND ACTION PLANS IN IMPLEMENTATION OF THE CLIMATE AGENDA

In compliance with the commitmens of the Paris Agreement, Albania is on the path of adapting the transition process by passing and approving the entire legal framework for the adaptation of high-emission sectors. Thus, as one of the contracting parties to the "Energy Community Treaty", Albania was obliged to approximate the EU Directive 2009/28 / EC "On the promotion of the use of energy from renewable sources". In accordance with the directive, the government approved Decision No. 27, dated 20.01.2016, "On the National Renewable Energy Plan", which sets a mandatory national objective: 38% of the final energy consumption of the country to be from renewable resources.

The plan also sets out support measures for achieving the following policy objectives:

i. Reduction of electricity imports;
ii. Diversification of primary energy sources for electricity supply;
iii. Reduce transmission and distribution losses
iv. Establishment of local businesses and employment opportunities by installing and producing parts / components / systems of RES plants according to the Albanian industrial sector;
v. Utilization of local energy sources especially in remote areas bringing jobs and improving the standard of living;

For other sectors of the economy, the decarboration agenda of the Albanian economy is already part of the integration processes in the European Union, and as such is under EU supervision.

[38] *https://www.eesc.europa.eu/en/news-media/press-releases/integrating-western-balkan-partners-eu-represents-geostrategic-investment-peace-says-eesc*

In October 2020, the EU established "Green Deal for the Western Balkans"[39], a transition mechanism to help and finance the cost of the transition to a low carbon economy and addresses 5 main\ pillars:

(1) climate action, including decarbonisation, energy and transport;
(2) the establishment of a circular economy (closed cycle), in particular dealing with waste, recycling, sustainable production and the efficient use of resources;
(3) biodiversity, aiming at the protection and restoration of the natural resources of the region;
(4) combating air, water and soil pollution; and
(5) sustainable food systems and rural areas.

The document asociated to the EU "Green Deals" mechanism specifies: "that the production of basic food and processing, together with fisheries and forests occupy a significant share in GDP, and for Albania this sector employs 40% of all employees and has a great potential for economic and stable development'[40].

The EU's objective for this investment plan is: "to cooperate with the financial institutions to support the countries of the Western Balkans in order to triple the current pace of renovation and energy saving of existing buildings and achieve almost zero emissions in new buildings".

Some other objectives of the plan are: "It is planned to increase the amount of the grant to support the private sector according to the EU investment's framework in the Western Balkans, and 50% of the private sector funding from the EU should be dedicated to innovation and green growth[41]."

Implementing this agenda requires a drastic transformation of our economy - starting with food production, energy production, transportation and infrastructure - and the replacement of old technology with low-emission technology alternatives. This transformation is costly in many sectors and requires determination in implementing the legal framework as well as other funding besides those of the pre-accession instrument set up by the EU (WBIF Projects).

It is clear to everyone that without proper funding the achievement of "net-zero issue" seems impossible, and the most powerful financial and banking actors in the world have joined the latest alliance (Net-Zero Banking Alliance)[42] with the commitment also for "net-zero banking", decarbonising their portfolios and focusing on green lending. It is time for the Albanian banking system to take on this role to green the economy and contribute to a safe environment. Many of the green investments could come with economic and social benefits

[39] *https://www.eesc.europa.eu/en/news-media/press-releases/integrating-western-balkan-partners-eu-represents-geostrategic-investment-peace-says-eesc*
[40] *https://ec.europa.eu/neighbourhood-enlargement/system/files/2020-10/communication_on_wb_economic_and_investment_plan_october_2020_en.pdf*
[41] *https://ec.europa.eu/neighbourhood-enlargement/system/files/2020-10/communication_on_wb_economic_and_investment_plan_october_2020_en.pdf*
[42] *https://www.unepfi.org/net-zero-banking/*

INTEGRATION AND HARMONIZATION OF LOCAL AND REGIONAL CLIMATE AGENDA IN THE BANKING AGENDA AND STRATEGIES

While banks themselves have low direct emissions, their impact on the climate comes mainly from the businesses and projects they finance, enable or even invest. The structure of banks' portfolios often reflects the more complete structure of the economies in which they operate. The need to harmoniz the banks' capital with the requirements for the target towards 1.5°C, will forces banks to analyze and view their portfolios from all the angles according to the climatic risks they may face. Starting with exposure in all high-emission sectors, in all geographical areas and for all asset categories.

Knowing the situation in each sector and consultation on the policies and strategies will make it possible to create a map of actions which will orient the banking sector towards opportunities that require restructuring or even investment in technological innovations according to the environmental agenda.

BUILDING A FRAMEWORK FOR CLIMATE RISK MANAGEMENT

Climate risk management is not just a process that will protect a bank from future loans losses, but is a proces that should start right now with identifying and measuring climate risks in the existing portfolio. Banks should start scanning and filtering those exposures where the physical risks mentioned above from climate change could cause them to lose.

The first step towards building a climate risk management framework should be the management of physical risks in the bank's current portfolio. Scanning and identification should be performed for each sector, according to the geographical positioning and location of collateral and for each asset category.

An example of scaning by sectors and counties could be as a portofolo file presented below:

	ABC BANK				Shkodra Regional Branch	
	Climate Risk		Date :			
		List of Climate Risk Credit Exposures				
		Flood				
	List of loans in the agricultural sector					
Nr	Firm	Purpose	Maturity	Amount	Location	Collateral
1	Shiroka	Blerja e Barke peshkimi				
2	Sera	Mbjellja e pemëve frutore				
3						
4						
Mitigate measures					Loss if it occurs	
Nr						
1	Offering a line of credit for the construction of a new anchor and the purchase of a flood-proof storage refrigerator				Costs	Value (ALL)
					TOTAL	
2	Offering a discount for immediate loan repayment				Costs	Value (ALL)
					TOTAL	
	Estimated value of loss if risk occurs			Exposure to mitigating measures		
	Other comments from the Branch Manager					
		Prepared by (Clerk)				
		Name	Surname	signature		

Created by the author

The second important step in designing a climate risk management framework is the management of transition risk. These are the risks that are transmitted to financial risks for the bank and those come from:

- changes in climate policy towards a specific sector of the economy;
- legal obligations in implementation of the climate and energy treaties for the reduction of high emissions;
- technological changes necessary for a safe environment;
- as well as from structural changes of the market: from changing consumer demand due to price changes; "carbon taxes" or incentives for the protection of natural ecosystems, which are conducive to a safe environment.

For each sector (mentioned above) where emission reduction is required, the bank should filter its exposure by answering the questions:

How many exposures does the bank have in the non-renewable energy sector (thermal power plants or hydropower plants)? Considering that the government target for the adaption of the energy sector is: "38% of the final energy consumption of the country to be from renewable sources"[43], how is

[43] *Goverment decision no. 27, dated 20.01.2016, "National Renewable Energy Plan"*

the bank harmonizing its lending policy towards the opportunity for necessary investments in renewable energy?

How much exposure does the bank have in the cement and of inerts industry? What is the bank's plan for the gradual shift of this exposure towards net-zero emission industries, which is also the objective of the environmental policy?

How much exposure do banks have in the agri-food industry and how many of these businesses have quality standard certificates?

How much exposure does the bank have to the transportation industry and the sale of non-electric cars?

How much exposure do banks have in the real estate sector: how many of the buildings which were granted credit from the bank, have certified heating according to environmental standards?

How much exposure is there to the heating and cooling business? Considering that the requirement for electric air conditioner without the standard heating certificate will bring the reduction and gradual restriction of this activity according to the envirmental policies.

How much exposure does the bank have in the tourism sector? Which beaches are exposed and for how long? How will the loans repayment schedule be restructed according to the forecasted changes during the summer season?

For all real sectors of the economy, the implementation of the national strategies and action plans for the mitigatition of the effects of climate change, requires funding at both regional and local levels. Banks may also view transition risk management as an opportunity for cooperation and channeling of international funds and grants raised by action plan requirements in any sector where intervention is urgent.

There are several financial instruments that have raised funds and aim at restructuring the high-emission sectors and regenerating natural ecosystems, one of them is the EU pre-accession instrument with a 9 billion euro investment plan for the above sectors (energy, transport, agri-food, closed cycle economy)[44]. This EU instrument has clearly stated that: 50% of the funds will finance "green projects" and innovation and that this process will be carried out together with financial institutions. Other instruments are behind environmental focused alliances and financial groups such as the Global Environment Facility (GEF)[45], which raises funds for finance projects to protect biodiversity. In cooperation with these instruments as well as international grants raised by sector-specific projects, banks can create synergies and, through syndicated loans and state guarantees, cofinance big and corauge projects to decarbonize industries staring from cement industry to greenhouse products and simultaneously

[44] *https://ec.europa.eu/neighbourhood-enlargement/system/files/2020-10/communication_on_wb_economic_and_investment_plan_october_2020_en.pdf*
[45] *https://fiftrustee.worldbank.org/en/about/unit/dfi/fiftrustee/fund-detail/gef*

achieving two objectives: i) minimizing the exposure of their portfolios to transition risks and ii) achieving the goal of reducing high emissions.

The third step in constructing a climate-risk-management framework is reviewing two aspects: first, the business and credit strategy including capital allocations, and the second, the loan approvals proces with the aim of integrating it into all risk-management processes, as the environmental assessment for any future lending.

1) The strategy review means that the bank in its business plans should clearly announce the gradual lending restrictions for sectors with exposure to environmental risk as well as providing restructuring plans for those sectors that are in the process of transition. The bank should also clearly communicate and disclose that it will not provide financing to businesses whose activities could degrade natural ecosystems. In the disclosure and transparency of environmental accountability, banks are not only avoiding reputational risks, but they are also showing willingness to apply the principles of bank accountability. Their strategies should include planned capital allocation to new markets providing safe environmental technology, such as renewable energy, construction of wind farms or solar panels, and the recycling and cleaning industry.
2) Review of the loan approvals process means that in the customer scanning process, environmental assessments at the macro level (industry sectors) and at the micro level (client and business segments) should be taken into account.

At the macro level, it should be taken into account whether the sector that seeks credit is included in the priority sectors and whether this sector is supported by the environmental plans of the Albanian government, the European community and international support. The investment can be approved even if the industry is in transit process when it is proven that the measures and actions taken by the business have mitigated the environmental impacts and this investment contributes positively to further minimization.

At the same time, consideration should be given to whether the project is green enough to enable its return to green financing with the advantage of channeling other funds from green project grants. The report of the independent group of experts of "Global Financial Stability Report No. 2020/001 "has estimated that they are ready to be distributed as climate finance around $ 100 billion"[46].

At the micro level, the assessment should be passed on to the business facility or property if the direct business emissions comply with environmental safety standards. In this context, it must be considered whether the raw materials and production and processing processes as well as the final product are within certified environmental standards.

[46] *IMF. 2020a. "Global Financial Stability Report No. 2020/001." Independent Experts Group on Climate Finance. 2020. "Delivering on the $100 Billion Climate Finance Commitment and Transforming Climate Finance."*

What is required of the banking sector is to integrate in their banking practices the standards of social responsibility and environmental sustainability (ESMR). Principles for Responsible Banking (PRB) [47]were introduced in 2019 and are already integrated by 1/3 of the global banking sector, along with the Principles for Responsible Investment. Many global financial and development institutions such as the World Bank, European Bank for Reconstruction and Development, IFC and the Green Climate Fund, and many other donors have adopted and integrated into their project financing practices the principles referred to such as Environmental and Social Risk Management (ESRM). The integration of these principles and standards would put the banking sector in a favorable position, enabling it the opportunity to channel more funds oriented towards the environmental agenda, both local and regional.

Transparency of climate-related financial data is also required. The Financial Stability Board[48] has also set transparency standards.

These normative practice, although informal, provide the basis for setting standards for sustainable financing by helping to ensure that private finance fulfills its role in contributing to the achievement of the 2030 Agenda for Sustainable Development and the Paris Agreement on Climate Change agreed by governments around the world in 2015.

CONCLUSIONS FOR EVOLVING

Economic models may not yet be able to accurately estimate the respective effect or even accurately predict the costs that will come to the economy from the risks of climate change, but climate science and its estimates have made it clear that if not acted upon now their effects on the existence of life on the planets will be irreparable.

Now is the time to take important action. If we want to have a secure planet earth, it needs all actors - international organizations; governments, banking institutions, including businesses and individuals to joint their efforts for an effective, coordinated and thoroughly reaction. Convinced that without the contribution of funding there are no results to the climate emergency, many financial institutions have been mobilized in alliances and taken commitments to channel their attention and funding towards addressing the climate changes. It is necessary for the Albanian banking system to follow the pace of change that is being sought, first by setting up the structure for recognizing and integrating climate risks in their risk management processes in order to protect banks' portfolios and, secondy, by reformulate lending strategies and orient capital and expertise towards green lending.

[47] *https://www.unepfi.org/banking/bankingprinciples/*

[48] *The Financial Stability Board's Task-Force on Climate-related Financial Disclosures Disclosures (TCFD)*
https://www.fsb-tcfd.org/ Task Force on Climate-related Financial Disclosures.

These developments need to be integrated into the day-to-day operations of banks in order to increase their capacity to manage climate risks (both current and future), but at the same time be able to take advantage of the moment when many global finances are oriented towards green investments. The principles of corporate social responsibility and environmental sustainability (CSRES) adopted by many international financial institutions (IFC, WB, etc.), and the inclusion of climate transparency, are of triple importance for the banking system:

- first, it protects banks from reputational risk as well as protects their portfolios from climate risks;
- second, this alignment with the principles on climate responsibility turns banks and the entire banking system adequate to channel the global financing raised for climate; and
- third, it enables banks to recognize opportunities and innovations and co-finance profitable investments with an impact on the green and sustainable growth of the Albanian economy.

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