IMPACT STUDY
ECONOMIC EFFECTS OF CGI

March 2019

Introduction

The Certificado de Garantía Inmobiliaria (CGI) is a novel financial instrument that allows owners of real estate properties to mortgage their asset to a bank, for a short term (1 to 12 months) so that the bank can borrow from other banks while using the mortgage as collateral. With this guaranty, the owner is also able to go to the bank, deposit it the certificate and obtain a return at the end of the deposit (a year as a maximum).

Particularly, real estate owners, one of the main advantages of the instrument is to generate financial inclusion, especially for the segment of the population who own small parcels of land as a savings instrument, but are not integrated to the Paraguayan financial system.

In this sense, the key challenge faced by the implementation of the property certificate is the ordering in the property registry (cadastro). Therefore, it is necessary that people know the benefits they can obtain when they regularize their property titles, for example, access to an annual rent for a property that may be idle and that only generates expenses through tax payments.

One of the main effects of CGI on the main macroeconomic variables, is that depositors will be able to have better access to credit, especially since the instrument will be associated to credit lines in accordance to the term of the deposit (short term).

Meanwhile, the banking intermediation activity, keeping everything else constant (ceteris paribus), will generate an impact on the country's Gross Domestic Product and this, in turn, on Private Consumption of economic agents and Gross Fixed Capital Formation, since the additional money received by economic agents will be destined, mainly, to consumption or savings (investment for others).

Once CGI is implemented, credit is expected to rise, generating inflationary pressures as new money would be created due the added wealth produced by the banks. Accordingly, this would eventually lead to an increase in the Monetary Policy Rate, to control a rise in prices.

As for the government revenues, the implementation of CGI would eventually lead to increases in income from the real estate tax. Currently, this tax is collected by municipalities and almost non-existent as a source of revenue for local governments. Local administration is currently incapable of properly collecting these taxes and registering them in their accounts. If CGI is applied, and the capacity of local municipalities improved, the greater registry of properties would not only help with the regularization of their titles (additional income) and the updating of the prices of real estate in line with the market, but it would help with fiscal decentralization efforts.

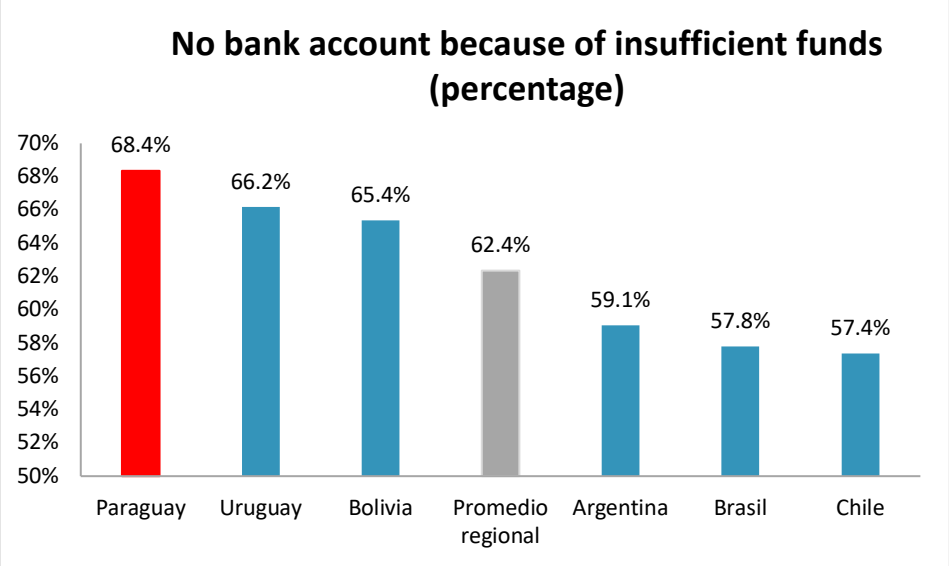
The impact study presented in this paper aims to estimate the effects that CGI would have on the main macroeconomic variables in a time period of 5 years (medium term).

The report contains 6 sections which includes; (i) the introduction, (ii) the business opportunities in Paraguay, (iii) description of data handling, (iv) the expected effects on the main macroeconomic variables and, finally, the (v) conclusions and (vi) annexes.

Paraguay as potential country for CGI implementation

According to the World Bank, Paraguay is classified as upper middle-income country, with a per capita GDP for 2017, at purchasing power parity is USD 8,827. For that same year, according to the permanent household survey, 26.4% of the population lives in poverty and 4.4% in extreme poverty. These indicators for the rural area of the country are 36.2% and 9.0%, respectively.

In addition, according to the World Bank Global Findex for 2017, 2,430,000 people do not have a bank account in Paraguay. Moreover, 30.9% of the population in the rural area do not have a bank account, ranking as one of the highest in the region. Of the segment of the population without a bank account, 68.4% indicate that they do not have an account because they lack sufficient funds to maintain it, a number that exceeds the records of the region.



Source: World Bank.

Furthermore, 10.1% of population without an account indicate that they do not have the necessary documentation to open it and 14.9% lack confidence in financial institutions.

In addition to the above, according to a study carried out by the Cadastro National Service (CNS) during 2018, 80% of the municipalities of the country have less than 6,000 urban cadastro records, which denotes the country's rural character.

Thus, Paraguay reflects shallow levels of financial service penetration coupled with the severe issues concerning property registration. This offers an immense opportunity to implement the CGI project. CGI could potentially work as driver for the formalization of real estate property titles and the financial inclusion for an ostracized segment of the population.

Of the 2,430,000 people without access to a bank account in the country, it is not possible to determine how many of them have real estate properties. Many low-income families who do not participate in the formal financial sector generally buy land parcels as a form of savings from "loteadoras". They generally make cash payments for a period of 12 years to these real-estate firms and in turn, they get a parcel with the land deeds. We propose that a partnership between the loteadoras, the agency and banks, in order to formalize these segments of the population and improve financial inclusion indicators.

From the total of people without a bank account, we could make the assumption that if people over 30 years old are the potential owners of real-estate, then it is possible of reaching approximately 1,607,534 new individuals[1].

However, this would require a joint effort between the future Certifier Agency, the banks and the municipalities, in order to explain to the owners of the land the importance of registering them and the benefits that could derive from it. For the population, this could allow them to participate in different forms of financial services and derive additional income obtained by the certification of the property.

Likewise, allowing people access to a bank account would result in countless benefits such as making payments to third parties, remittances, insurance, credit lines, use of debit or credit cards, among others, which would contribute to improve their living conditions and reduce poverty.

Data management

The data used to analyze the economic effects of CGI was obtained from Cadastro National Service (CNS). The data contains the number of cadastral accounts (number of registered properties) and the referential values that were established by this institution to calculate the property tax.

When considering the quality of the data, it's important to mention that the referential values are below from the real estate market values, and adjusting them is a complicated task, because the information on the features of the property are unavailable, the only feature known is land area.

[1] We estimated this number of potential new clients by considering the percentage of people in Paraguay in the aforementioned age.

The information covers the whole country (18 states with their municipalities) of the urban area of Paraguay. The registered properties were 1,750,074, which were based using the weighted average by land area. This adjustment was done because the data corresponding to the area of the construction is not available.

In regard to the data used by this study, we only considered data from urban areas. The quality of data from rural areas is generally very poor. An important amount of rural properties is registered under rural denomination, when they are actually an urban one, in order to pay less taxes. For this reason, the rural data have referential values that are below of market values and tend to be unreliable due to incorrect bookkeeping.

Another data limitation was inability to determine the amount of mortgaged real estate properties from public records.

Finally, referring to the handling of the data, the referential values of the real estate properties were adjusted from 2020 to 2023 by the central value of inflation target range (4.0%), in line with the practices of CNS every year.

When analyzing the economics effects of the CGI, the following three scenarios were considered:

- **Base:** This scenario uses the Central Bank of Paraguay (CBP) forecast for 2019 (with no adoption of CGI). From 2020 to 2023, it uses the average growth rates of the long term of the variables.
- **Favorable:** In this case, owners of 1% of the registered properties make a CGI for 30% of the referential value.
- **Unfavorable:** Owners of 1% of registered properties make a CGI for the 15% of the referential value.

The forecast of the main macroeconomic variables was made for 5 years, that is, from 2019 to 2023, and the results are conditioned to the assumptions made, therefore, any modification in these will generate important changes in the calculated macroeconomic impacts.

Effect on macroeconomic variables

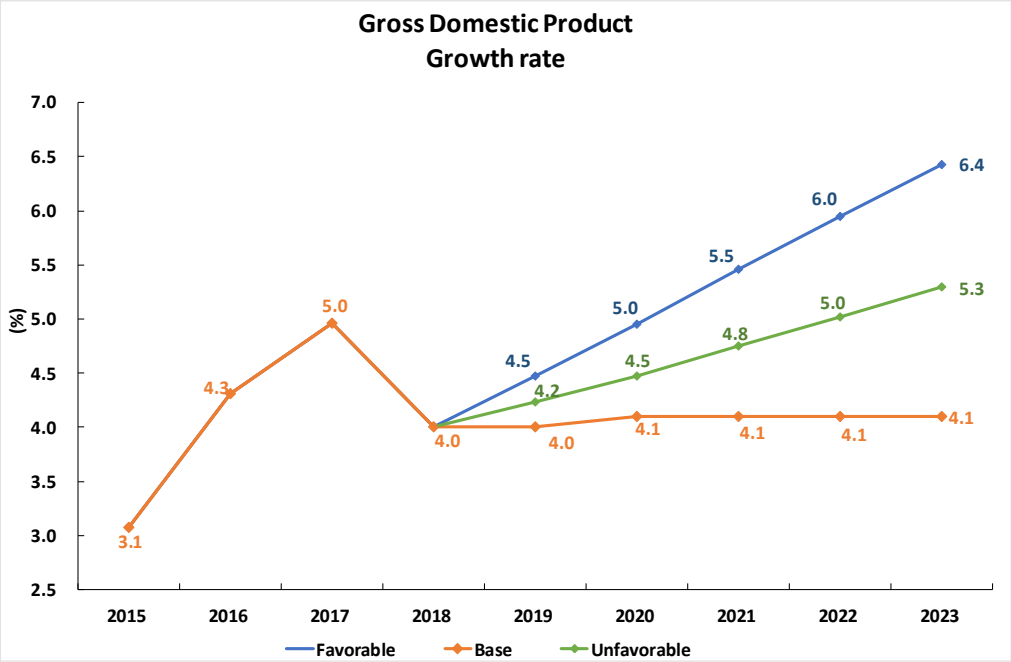
The implementation of the CGI will generate internal dynamics that will result in an increase in the Gross Domestic Product, as a result of the intermediary activity of the financial institutions. The additional income that people would receive for the certificate will allow them to consume and/or save (investment for other economic agents) and, therefore, an increase in credit to the private sector. Its rapid growth could generate inflationary pressures and we have assumed the adjustment of the monetary policy rate to counteract them. Below, the main findings are detailed.

Gross Domestic Product (GDP)

The Base scenario uses the forecast of the CBP for 2019, and from 2020 to 2023 it corresponds to the average of the potential GDP growth rate of the last four years.

On the Favorable and Unfavorable scenarios, the impact was based on GDP forecast published by the Central Bank for 2019. The total GDP generated with the implementation of the CGI was forecasted, considering that the level of GDP participation corresponding to financial intermediation is 5.2%, maintaining other conditions the same (ceteris paribus), which is assumed to present the same dynamics observed during 2019.

The results are shown below:



Source: CBP and MF Economía.

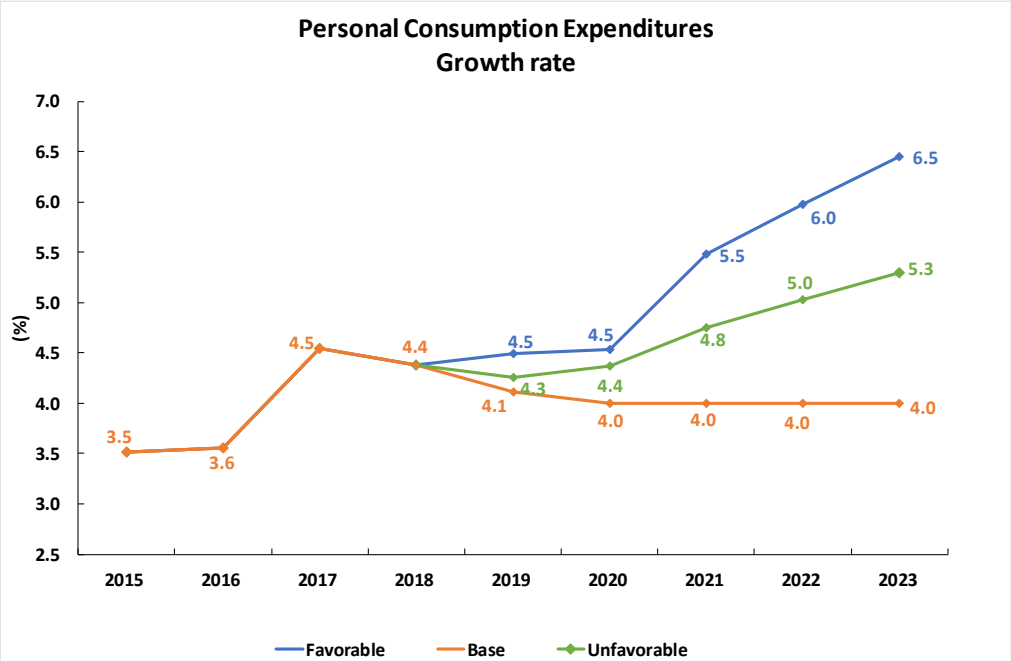
Private Consumption

For the variable of Private Consumption, the Base scenario was built by using the average of the last four years of the long-term component of the variable.

On the Favorable and Unfavorable scenarios, GDP forecasts were based on the participation rate of its separate components as well. However, to avoid that all components of the GDP grow at the same rate, we performed an estimation of the Private Consumption for 2019 and 2020

using historical information and the X13 package of the Eviews econometric program. From 2021 to 2023 same participation rate (63.9%) was applied.

The results are presented below:



Source: CBP and MF Economía.

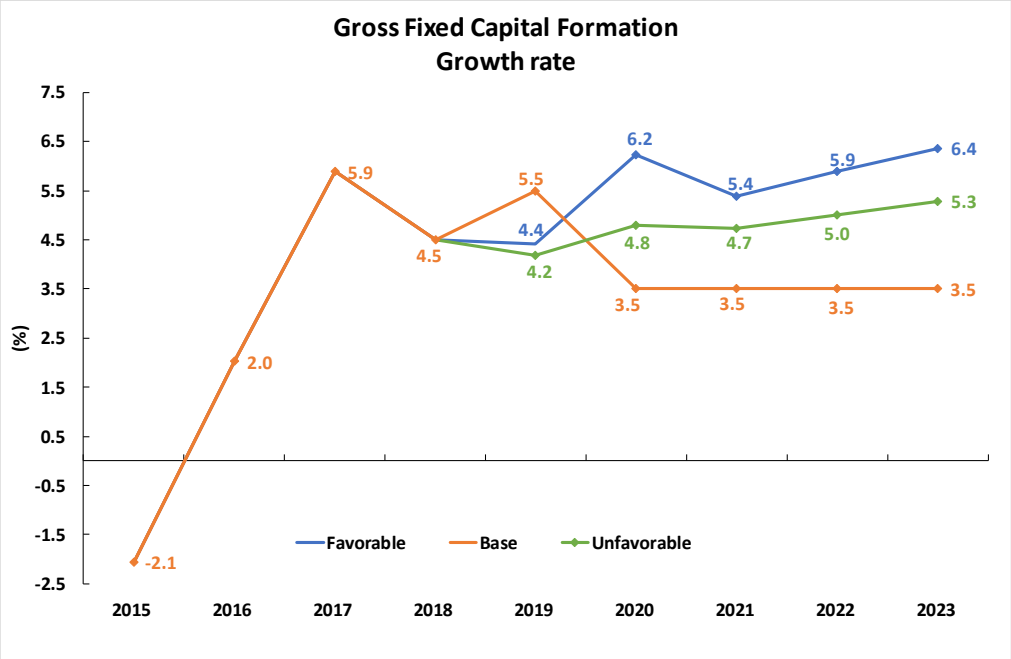
Gross Fixed Capital Formation

For the variable of Gross Fixed Capital Formation, the Base scenario was built by using the average of the last four years of the long-term component of the variable.

As for the Favorable and Unfavorable scenarios, the same methodology was used as described in the previous section. For 2019 and 2020 Gross Fixed Capital Formation forecasts, historical information was taken into account, with the Eviews' X13 module, to avoid that all components of the GDP increase in the same rate. For 2021 until 2023, we used the participation rate of this variable (18.7%) in the GDP.

It should be noted, that the forecast of the CBP in 2019 shows an increase of 5.5% for the Gross Fixed Capital Formation, that will not be captured neither on the Favorable scenario nor Unfavorable one. For that reason, the lines in the graph below are crossed in the next year.

The results are presented below:



Source: CBP and MF Economía.

Private Sector Credit

On this section, we used two methodologies (A and B) to calculate the stock of credit for 2019 (Base scenario):

- Methodology A: the forecast for 2019 used the same variation observed in 2018.
- Methodology B: An econometric equation of credit demand was used, using as explanatory variables the active interest rate, GDP, the nominal exchange rate and the lag of the private sector credit. The coefficient corresponding to the credit response to changes in the level of GDP (elasticity) was taken from this equation. Then, with this value, coupled with the GDP growth rate and the inflation rate, we projected private sector credit for 2019.

For the period 2020 to 2023, we considered the average of the potential private sector credit growth rate of the last four years.

To estimate the impact of the CGI, we considered two methodologies (1 and 2):

- Methodology 1: The CGI was handled as a liability for the bank. For this, we used the monetary multiplier to determine the level of monetary aggregate and applied the legal reserves requirement to obtain the flow of private credit.
- Methodology 2: Banks create money (give credit) for the number of deposited CGIs, in accordance to the legal reserve requirements and taking in account a geometric progression.

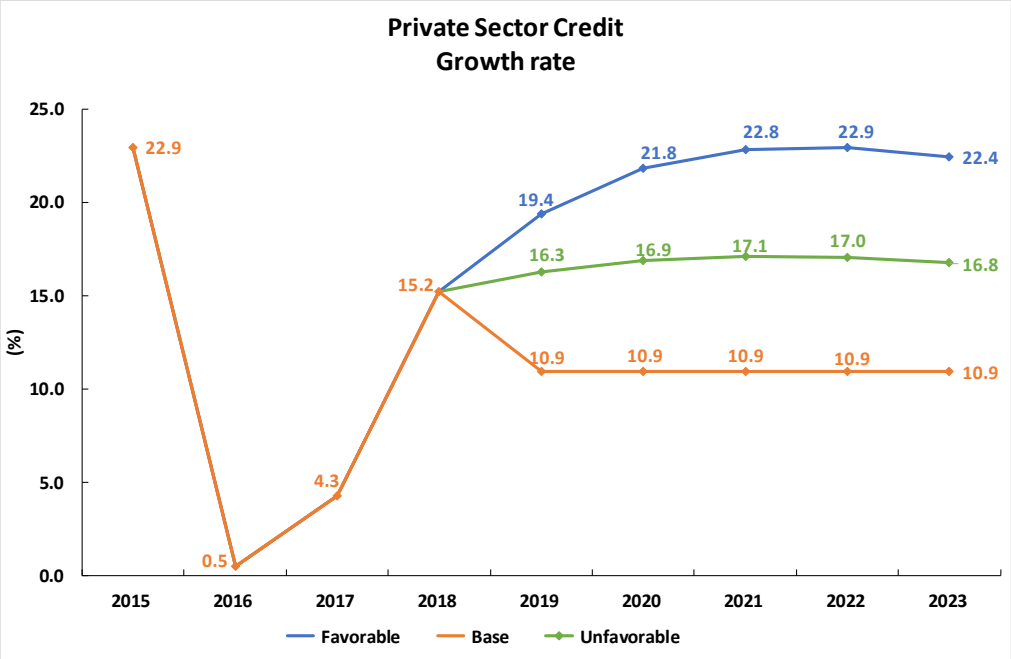
The results will be shown below, where the following table presents a combination of both methodologies:

Private Sector Credit growth rate (%)

	Methodology (A & 1)		Methodology (A & 2)		Methodology (B & 1)		Methodology (B & 2)	
	Favorable	Unfavorable	Favorable	Unfavorable	Favorable	Unfavorable	Favorable	Unfavorable
2015	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9
2016	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
2017	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
2018	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2
2019	19.4	16.3	26.3	19.7	20.4	16.7	27.3	20.2
2020	21.8	16.9	32.0	22.4	21.6	16.8	31.8	22.3
2021	22.8	17.1	33.4	23.5	22.7	17.0	33.2	23.4
2022	22.9	17.0	32.4	23.6	22.8	17.0	32.3	23.5
2023	22.4	16.8	30.5	23.0	22.3	16.7	30.4	23.0

Source: CBP and MF Economía.

The following graph contains the data from the combination of methodology A and 1:



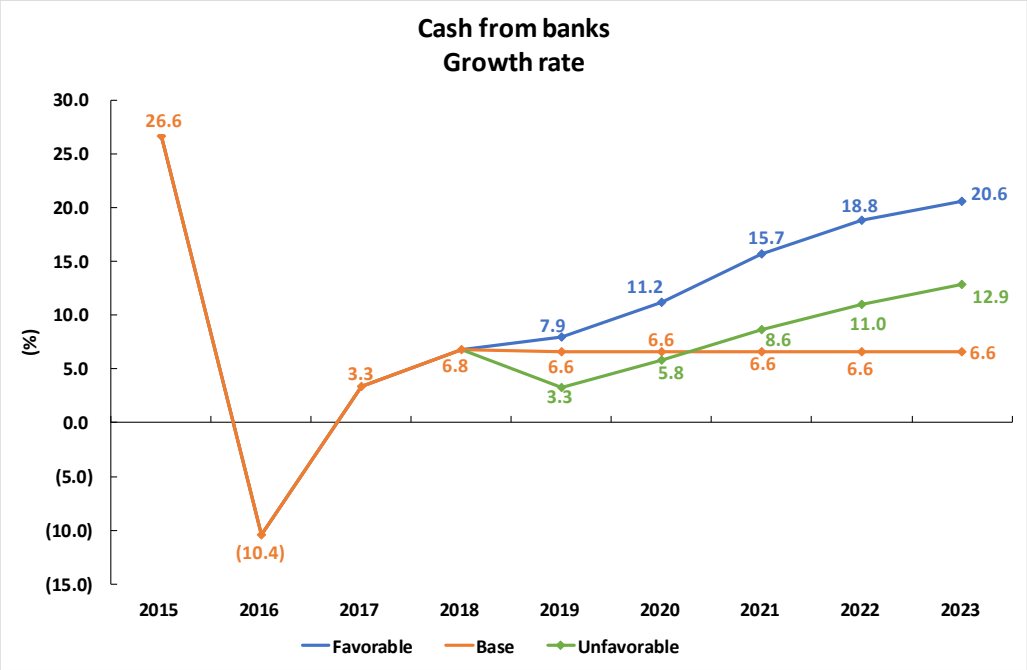
Source: CBP and MF Economía.

Cash and cash equivalents from Banks

Base scenario from 2019 to 2023 corresponds to the average of the growth rate in the last four years. However, it is important to mention that this variable reflects great variability, which could be associated, among other factors, to economic performance.

To estimate the impact of CGI, we considered the scenario where a bank holding CGIs could obtain liquidity from other banks, assuming a 50% haircut.

The following graph presents the results:



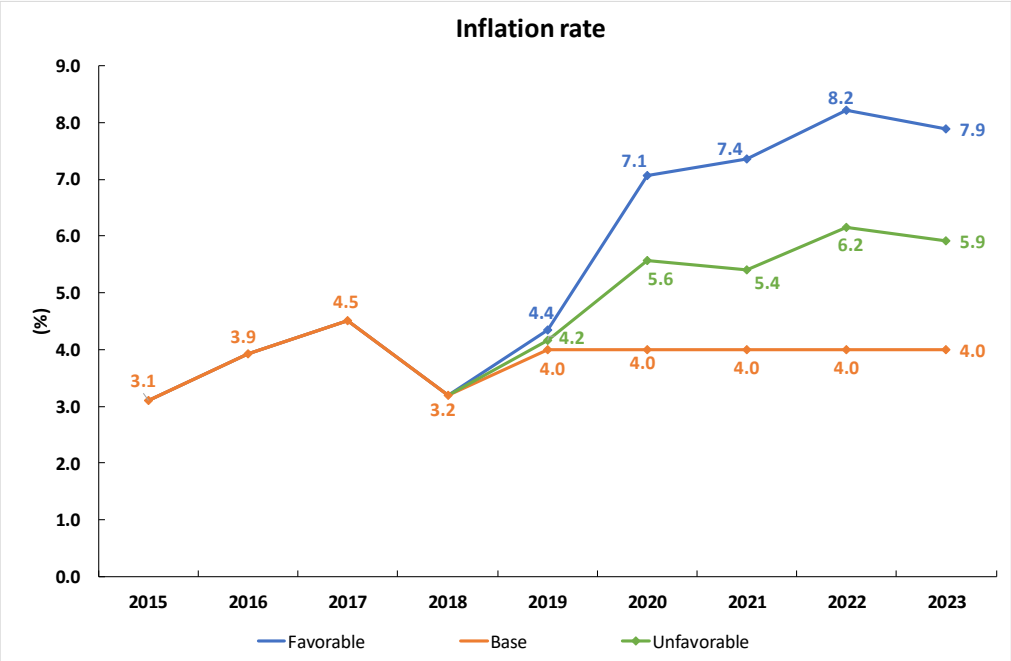
Source: CBP and MF Economía.

Inflation Rate

The inflation rate for the Base scenario (from 2019 to 2023) is 4.0%, this is the central value of the inflation target range (4.0% ± 2 percentual points) established by the Central Bank.

To forecast the inflation rate, we used an econometric equation with the following explanatory variables: GDP; real exchange rate; monetary liquidity (M2) and the inflationary inertia. To project M2, we applied the average proportion in accordance to the private sector credit observed in the last four years. For the exchange rate, there has been an appreciation of the currency over the last few years, so we assumed an appreciation of 2.0% in the Unfavorable scenario and 1.0% in the Favorable one.

Next the results could be seen:



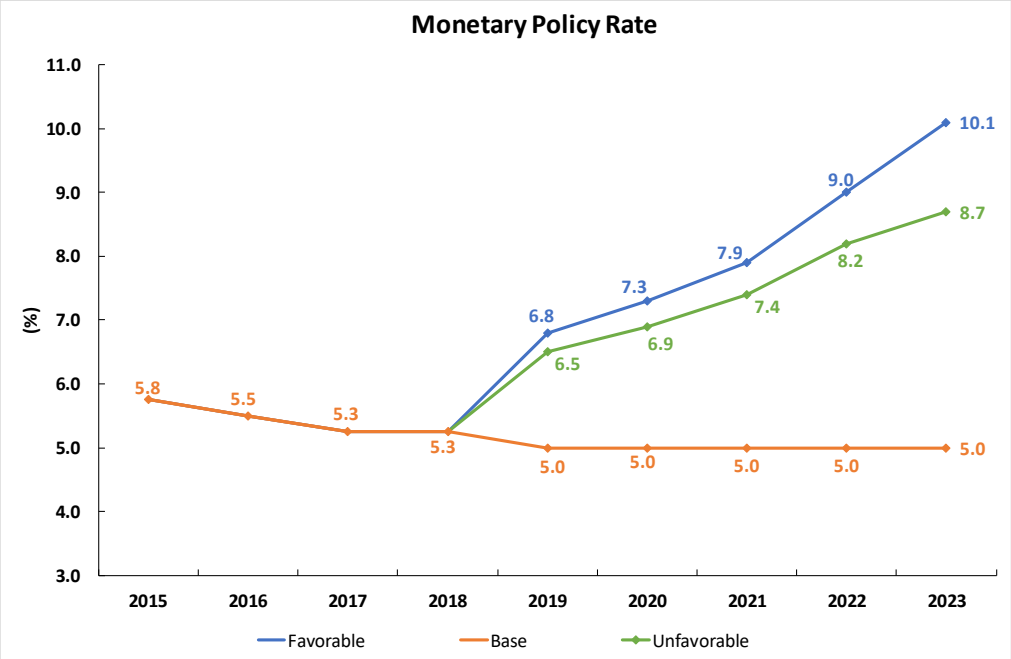
Source: CBP and MF Economía.

Monetary Policy Rate

The expected economic growth and the money creation associated with it, generate inflationary pressures, mainly as a result of credit lines granted to clients who deposit the CGI in the banks. For this reason, we also expect the Monetary Authority to slowly rise their policy rate to counteract price increases.

To estimate the Monetary Policy Rate, we used an econometric equation, that considers the following explanatory variables; the inflation target established by the central bank, the deviation between the observed inflation and the targeted inflation rate, and the GDP gap (difference between potential GDP and observed GDP).

The results are presenting below:



Source: CBP and MF Economía.

Government Fiscal Revenues

Paraguay is made up of 18 subnational units with 254 Municipalities. The published information corresponding to the government tax revenues is only available at the central government level. Thus, since the real estate tax is part of the income received by the Municipalities, there are no historical series that allows an analysis of its evolution.

However, there is information about the property tax estimated by the CNS for urban properties in the year 2019, which they expect to rise, in the country, to Gs. 749,939 million.

Estimated real estate tax for urban properties

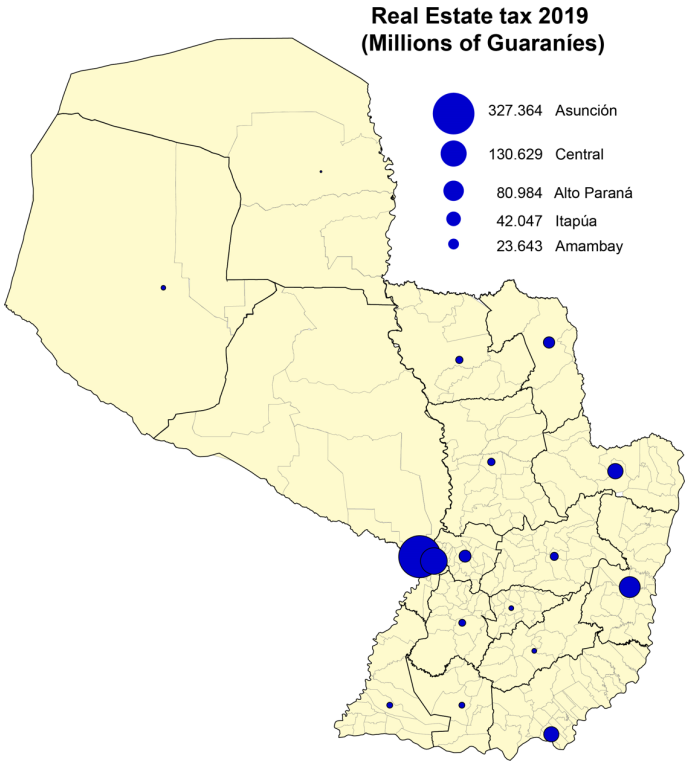
(Year 2019)

State	(Millions of Guaraníes)
Alto Paraguay	650
Alto Paraná	80,984
Amambay	23,643
Boquerón	3,963
Caaguazú	12,242
Caazapá	4,202
Canindeyú	43,434
Capital	327,364
Central	130,629
Concepción	9,583
Cordillera	26,430
Guairá	4,180
Itapúa	42,047
Ñeembucú	6,310
Misiones	6,390
Paraguarí	8,756
Presidente Hayes	9,075
San Pedro	10,057
Total	**749,939**

Source: Cadastro National Service.

Note: The Paraguarí's data was adjusted due to inconsistent information.

Moreover, the subnational entities that CNS predicts will obtain the highest income for real estate tax are: Capital (Gs. 327,364); Central (Gs. 130,629); Alto Paraná (Gs. 80,984); Canindeyú (Gs 43,434) and Itapúa (Gs 42,047).



Source: Cadastro National Service and MF Economía.
Note: The Paraguarí's data was adjusted due to inconsistent information.

Given there are no records on property taxes received the 254 Municipalities, we can use the case of the Municipality of Asunción as a reference. Tax collection efforts for the years 2015 and 2016 showed that the budget execution (collected / budgeted) for real estate tax was around 89% and 78%, respectively.

With the implementation of the CGI, government authorities could expect that the Municipalities would increase their revenue collection, due both to the normalization of the property registry of a greater number of people, as well as to the updating of the reference values of the properties, so that they will be in accordance with the market prices. The latter as a result of the technology that the Certifier Agency will use to make the appraisals.

However, for this to materialize, it requires a joint effort not only amongst different government departments and ministries, but at all government levels. It is critical that real estate owners have strong incentives to legalize their assets, with a view to accessing an additional income. Through CGI, idle lands that generate maintenance costs could also contribute additional revenues to Municipalities while also improving the living conditions of their inhabitants.

Concluding remarks

In order to perform an analysis of the impact of CGI on the main macroeconomics variables, this study considered the information of Cadastro National Service. The Paraguayan land registry establishes that there are 1,750,074 real estate properties which cover the entire country. The quality of this information however is relatively poor, especially since the data has serious issues related to the referential values established by the institution, which are below of the market values.

Furthermore, assumptions were made about the number of potential clients and the percentage of the property's certification. In this sense, the results presented in this paper are conditioned to the assumptions, and thus we expect changes in case any assumptions vary.

The implementation of the CGI would initially benefit the country through the ordering of the cadastro system, that is, Paraguay would have institutionalization gains. This transformation would begin firstly in urban areas by regularizing the property titles. Subsequently, rural areas could be covered, which are the ones with the greatest land registry problems.

Also, we expect that the Certifier Agency would update the price of properties, through the use of artificial intelligence in the elaboration of appraisals of real estate and work to increase the number of properties registered, as well as to correct the registration problems currently exist.

In addition, CGI could favor financial inclusion, since in Paraguay there are currently 2,430,000 people without a bank account, of which it is estimated that 1,607,534 could own real estate.

The certification of these properties would allow them to have additional funds that, according to the World Bank, is one of the main obstacles to accessing financial services in Paraguayan banks. We expect that the widespread use of this instrument would help these people access additional benefits such as the possibility of obtaining insurance, credit lines, debit and credit cards, among others, that would improve their living conditions and reduce poverty.

In macroeconomic terms, an increase in economic activity would be expected, due to the volume of CGI deposits received by banks, which would trigger an intermediation process that affects financial activity and, of course, the GDP, keeping other things equal (ceteris paribus).

The increase in GDP would generate that its components, on the spending side, also increase. In this sense, an upturn in Private Consumption and Gross Fixed Capital Formation is expected, due to the additional income obtained by depositing the instrument may be used for consumption or savings (investment for other economic agents).

Once the target population is able to deposit the CGI in banking institutions, we expect that they would be able to access new credit lines more easily, even obtain better financing conditions (lower rates), which will stimulate the credit market.

Meanwhile, banks could use the financial instrument to obtain liquidity from other financial institutions.

Likewise, the Paraguayan Government, through the Municipalities, could increase fiscal revenues through property tax, resulting from the registration of properties and price updates the in line with market.

Regarding the operational aspects of CGI, there are numerous risks faced by the agency. The main one would be that the agency would only receive poor quality properties (adverse selection), such as those that would be covered by the deposit guarantee fund, limiting the potential of the instrument

Furthermore, low income families are generally quite resilient to go through the process of formally registering their properties. Generally, this is a result of the large cultural barriers and lack of trust of the formalization process in general. This reflects the importance of active work to improve the country's institutions, which involves providing financial education to the population.

Finally, the main estimated macroeconomic results are summarized below:

	Economic variable	**Expected effect 2019 - 2023**
Economy	Economic Growth (Annual variation rate of GDP)	Favorable: (4,5% - 6,4%) Unfavorable: (4,2% - 5,3%)
	Private Consumption (Annual variation rate)	Favorable: (4,5% - 6,5%) Unfavorable: (4,3% - 5,3%)
	Gross Fixed Capital Formation (Annual variation rate)	Favorable: (4,4% - 6,4%) Unfavorable: (4,2% - 5,3%)
Banking Sector	Private Sector Credit (Annual variation rate)	Favorable: (19,4% - 22,4%) Unfavorable: (16,3% - 16,8%)
	Cash (Annual variation rate)	Favorable: (7,9% - 20,6%) Unfavorable: (3,3% - 12,9%)
Central Bank of Paraguay	Inflation (Annual variation rate of CPI)	Favorable: (4,4% - 7,9%) Unfavorable: (4,2% - 5,9%)

	Monetary Policy Rate	Favorable: (6,8% - 10,1%) Unfavorable: (6,5% - 8,7%)
Government	Real estate tax	Expected improvement in tax revenues at the municipal level, due to the regularization of real estate prices in line of the market

Annex 1: Number of cadastro accounts and the referential values weighted average by the ground surface

		Official value of property (Guaraníes)	
Satate	**N° of cadastro accounts**	**Weighted average by land area**	**Maximun**
Alto Paraguay	992	145,067,824	3,671,496,016
Alto Paraná	241,611	20,815,206	40,507,294,307
Amambay	71,425	437,942,210	27,436,482,304
Boquerón	10,022	116,597,144	84,969,267,277
Caaguazú	66,921	24,678,997	9,809,031,045
Caazapá	12,745	28,108,019	24,108,100,519
Canindeyú	30,714	34,636,531	27,282,264,844
Capital	168,088	198,017,020	411,069,511,260
Central	673,370	14,663,621	371,233,669,909
Concepción	38,436	150,747,591	71,464,758,798
Cordillera	109,834	16,274,148	70,368,216,022
Guairá	14,047	41,052,393	47,217,308,456
Itapúa	123,621	26,609,901	294,722,703,929
Ñeembucú	42,827	23,500,293	53,314,022,326
Misiones	27,364	21,394,049	11,327,540,224
Paraguarí	49,058	25,782,724	35,900,738,478
Presidente Hayes	25,241	157,637,409	20,728,260,348
San Pedro	43,758	4,132,598	2,000,668,320
Total	**1,750,074**		

Source: Cadastro National Service and MF Economía's estimations.

Annex 2: Certifications Favorable Scenario

State	2019 Certifications (Millions of Guaraníes)	2020 Certifications (Millions of Guaraníes)	2021 Certifications (Millions of Guaraníes)	2022 Certifications (Millions of Guaraníes)	2023 Certifications (Millions of Guaraníes)
Alto Paraguay	2,026	4,214	6,574	9,116	11,851
Alto Paraná	480,714	999,886	1,559,822	2,162,954	2,811,840
Amambay	321,700	669,137	1,043,854	1,447,477	1,881,720
Boquerón	10,538	21,919	34,193	47,414	61,639
Caaguazú	30,780	64,023	99,876	138,495	180,043
Caazapá	2,604	5,417	8,450	11,717	15,233
Canindeyú	35,262	73,345	114,419	158,661	206,259
Capital	12,835,653	26,698,159	41,649,127	57,753,457	75,079,494
Central	4,172,652	8,679,116	13,539,421	18,774,663	24,407,062
Concepción	251,960	524,078	817,561	1,133,685	1,473,790
Cordillera	175,499	365,037	569,458	789,648	1,026,542
Guairá	7,517	15,636	24,392	33,823	43,971
Itapúa	469,066	975,658	1,522,026	2,110,543	2,743,706
Ñeembucú	106,141	220,774	344,407	477,578	620,851
Misiones	26,743	55,624	86,774	120,327	156,425
Paraguarí	61,687	128,310	200,163	277,559	360,827
Presidente Hayes	63,044	131,132	204,566	283,665	368,764
San Pedro	15,215	31,647	49,369	68,459	88,997
Total	**19,068,803**	**39,663,110**	**61,874,452**	**85,799,240**	**111,539,013**

Source: Cadastro National Service and MF Economía forecast.

Annex 3: Certifications Unfavorable Scenario

State	2019 Certifications (Millions of Guaraníes)	2020 Certifications (Millions of Guaraníes)	2021 Certifications (Millions of Guaraníes)	2022 Certifications (Millions of Guaraníes)	2023 Certifications (Millions of Guaraníes)
Alto Paraguay	1,013	2,107	3,287	4,558	5,925
Alto Paraná	240,357	499,943	779,911	1,081,477	1,405,920
Amambay	160,850	334,568	521,927	723,738	940,860
Boquerón	5,269	10,959	17,097	23,707	30,819
Caaguazú	15,390	32,011	49,938	69,247	90,021
Caazapá	1,302	2,708	4,225	5,859	7,616
Canindeyú	17,631	36,673	57,209	79,330	103,130
Capital	6,417,827	13,349,079	20,824,564	28,876,728	37,539,747
Central	2,086,326	4,339,558	6,769,710	9,387,332	12,203,531
Concepción	125,980	262,039	408,781	566,842	736,895
Cordillera	87,749	182,518	284,729	394,824	513,271
Guairá	3,759	7,818	12,196	16,912	21,985
Itapúa	234,533	487,829	761,013	1,055,272	1,371,853
Ñeembucú	53,071	110,387	172,204	238,789	310,426
Misiones	13,371	27,812	43,387	60,163	78,212
Paraguarí	30,844	64,155	100,081	138,780	180,413
Presidente Hayes	31,522	65,566	102,283	141,832	184,382
San Pedro	7,607	15,824	24,685	34,229	44,498
Total	**9,534,402**	**19,831,555**	**30,937,226**	**42,899,620**	**55,769,506**

Source: Cadastro National Service and MF Economía forecast.

Annex 4: Forecast using X13

Private Consumption

FORECASTING
Origin 2018.4
Number 8

Forecasts and Standard Errors of the Prior Adjusted Data

Date	Forecast	Standard Error
2019.1	33549321.75	602216.758
2019.2	34517004.06	714601.609
2019.3	34288787.96	811570.020
2019.4	36226761.74	898129.352
2020.1	34343191.67	986898.560
2020.2	35310873.97	1064585.874
2020.3	35082657.87	1136977.309
2020.4	37020631.65	1205027.683

Confidence intervals with coverage probability (0.95000)

Date	Lower	Forecast	Upper
2019.1	32368998.60	33549321.75	34729644.91
2019.2	33116410.64	34517004.06	35917597.47
2019.3	32698139.95	34288787.96	35879435.97
2019.4	34466460.55	36226761.74	37987062.92
2020.1	32408906.04	34343191.67	36277477.30
2020.2	33224324.00	35310873.97	37397423.95
2020.3	32854223.30	35082657.87	37311092.45
2020.4	34658820.80	37020631.65	39382442.51

Gross Fixed Capital Formation

FORECASTING
Origin 2018.4
Number 8

Forecasts and Standard Errors of the Transformed Data

Date	Forecast	Standard Error
2019.1	16.18	0.082
2019.2	16.12	0.098
2019.3	16.07	0.103
2019.4	16.17	0.105
2020.1	16.18	0.119
2020.2	16.15	0.128
2020.3	16.06	0.134
2020.4	16.15	0.138

Confidence intervals with coverage probability (0.95000)
On the Original Scale

Date	Lower	Forecast	Upper
2019.1	9025157.30	10592770.95	12432669.33
2019.2	8251388.53	10003005.68	12126458.74
2019.3	7755188.57	9492004.99	11617790.84
2019.4	8564871.05	10526240.30	12936766.26
2020.1	8433500.47	10651370.92	13452504.43
2020.2	8050649.20	10348775.62	13302921.80
2020.3	7253200.95	9433943.52	12270346.70
2020.4	7910998.86	10362549.01	13573813.35

Annex 5: Econometric equation of Private Sector Credit and econometric tests

Econometric equation

Dependent Variable: LOG(Private Credit)
Method: Least Squares
Sample: 2003 2018
Included observations: 16

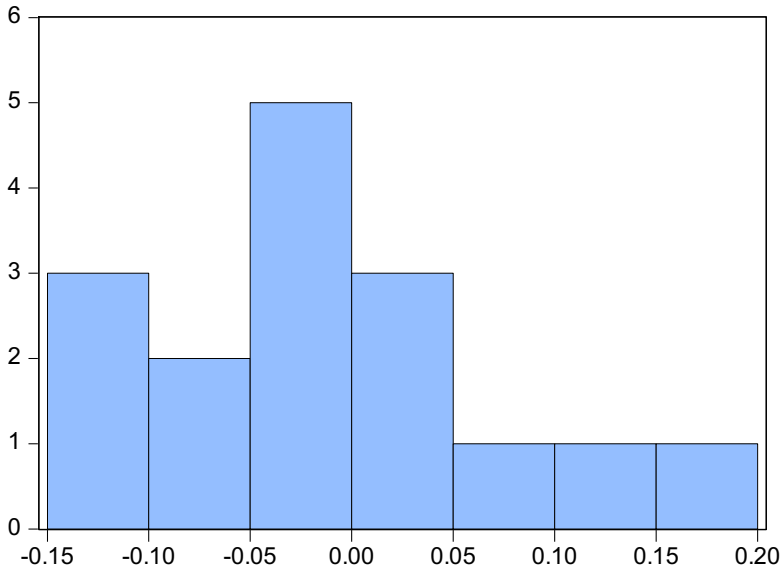
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(GDP)	**2.315747**	0.740593	3.126884	0.0096
LOG(Active interest rate)	-0.146953	0.219175	-0.670481	0.5164
LOG(Private Credit(-1))	0.497306	0.158347	3.140612	0.0094
LOG(Nominal ER)	-0.692408	0.210301	-3.292467	0.0072
C	-28.69512	11.26885	-2.546410	0.0272

R-squared	0.993131	Mean dependent var	16.95187
Adjusted R-squared	0.990633	S.D. dependent var	1.001627
S.E. of regression	0.096939	Akaike info criterion	-1.579161
Sum squared resid	0.103369	Schwarz criterion	-1.337727
Log likelihood	17.63329	Hannan-Quinn criter.	-1.566798
F-statistic	397.6049	Durbin-Watson stat	1.895678
Prob(F-statistic)	0.000000		

Summary of econometric tests

Test	Name	Critic value	P-value	Result
Normality	Jarque-Bera	0.70	0.70	Normality
Serial Correlation	Breusch-Godfrey	1.85	0.21	No autocorrelation
Heteroskedasticity	Breusch-Pagan-Godfrey	0.94	0.48	Homoskedasticity

Normality test



Series: Residuals	
Sample 2003 2018	
Observations 16	
Mean	-1.49e-14
Median	-0.007319
Maximum	0.191339
Minimum	-0.117417
Std. Dev.	0.083014
Skewness	0.512725
Kurtosis	3.002168
Jarque-Bera	0.701036
Probability	0.704323

Serial correlation test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.854748	Prob. F(2,9)	0.2116
Obs*R-squared	4.669889	Prob. Chi-Square(2)	0.0968

Heteroskedasticity test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.938389	Prob. F(4,11)	0.4773
Obs*R-squared	4.070674	Prob. Chi-Square(4)	0.3965
Scaled explained SS	1.926115	Prob. Chi-Square(4)	0.7493

Annex 6: Econometric equation of inflation rate, forecast and econometric tests

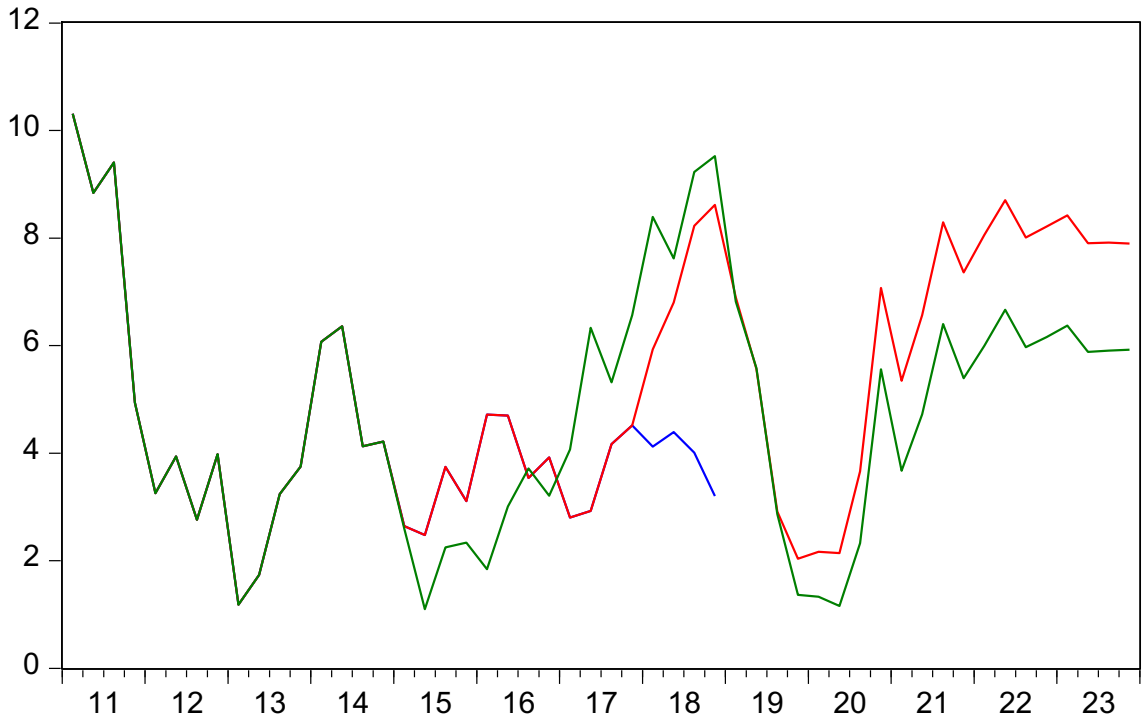
Econometric equation

Dependent Variable: Inflation
Method: Least Squares
Sample (adjusted): 2005Q2 2018Q4
Included observations: 55 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Inflation(-1)	0.752033	0.095027	7.913902	0.0000
Inflation(-3)	0.438060	0.117110	3.740598	0.0005
Inflation (-4)	-0.450687	0.105045	-4.290429	0.0001
D(LOG(RER(-1)),0,4)	13.06068	3.674769	3.554151	0.0009
D(LOG(GDP(-4)),0,4)	17.62712	7.376419	2.389659	0.0209
D(LOG(GDP(-5)),0,4)	-16.66187	7.293721	-2.284413	0.0269
D(LOG(M2),0,4)	7.405317	2.828782	2.617846	0.0119
C	0.531620	0.698159	0.761459	0.4502

R-squared	0.743111	Mean dependent var	5.471924
Adjusted R-squared	0.704851	S.D. dependent var	3.038699
S.E. of regression	1.650853	Akaike info criterion	3.974185
Sum squared resid	128.0899	Schwarz criterion	4.266161
Log likelihood	-101.2901	Hannan-Quinn criter.	4.087094
F-statistic	19.42262	Durbin-Watson stat	2.072156
Prob(F-statistic)	0.000000		

Forecast

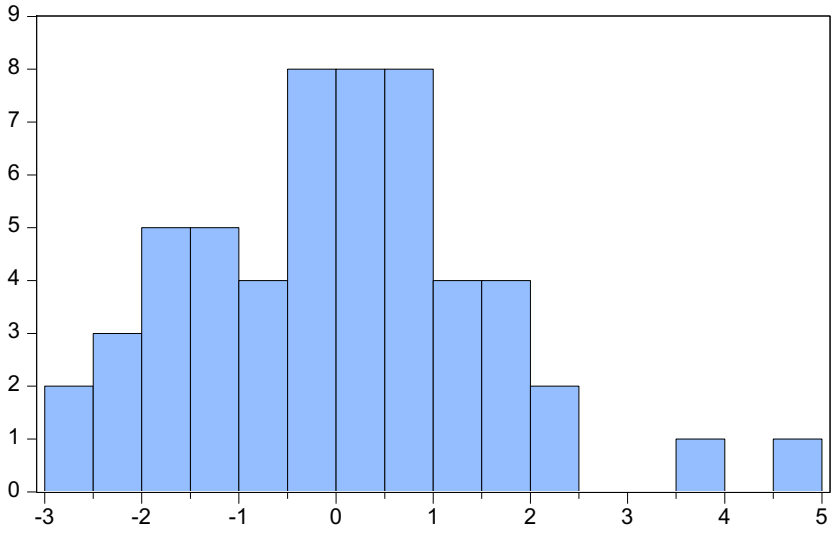


Favorable scenario Unfavorable scenario

Summary of econometric tests

Test	Name	Critic value	P-value	Result
Normality	Jarque-Bera	3.11	0.21	Normality
Serial Correlation	Breusch-Godfrey	1.33	0.27	No autocorrelation
Heteroskedasticity	Breusch-Pagan-Godfrey	1.64	0.15	Homoskedasticity

Normality test



Series: Residuals	
Sample 2005Q2 2018Q4	
Observations 55	
Mean	2.89e-15
Median	0.024841
Maximum	4.799527
Minimum	-2.911539
Std. Dev.	1.540141
Skewness	0.490806
Kurtosis	3.627445
Jarque-Bera	3.110364
Probability	0.211151

Serial correlation test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.334640	Prob. F(5,42)	0.2684
Obs*R-squared	7.540616	Prob. Chi-Square(5)	0.1834

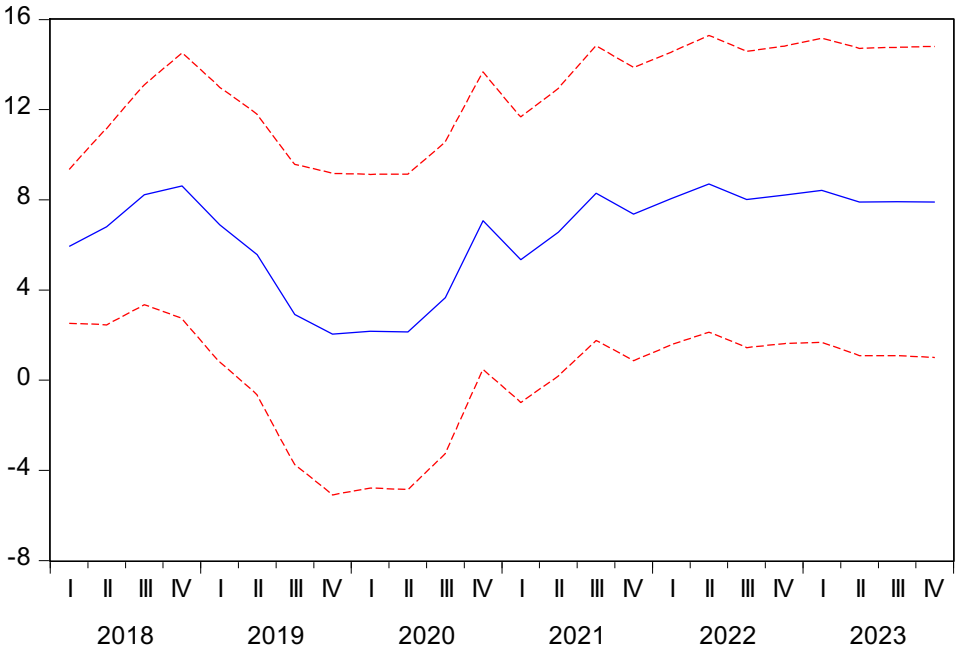
Heteroskedasticity test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

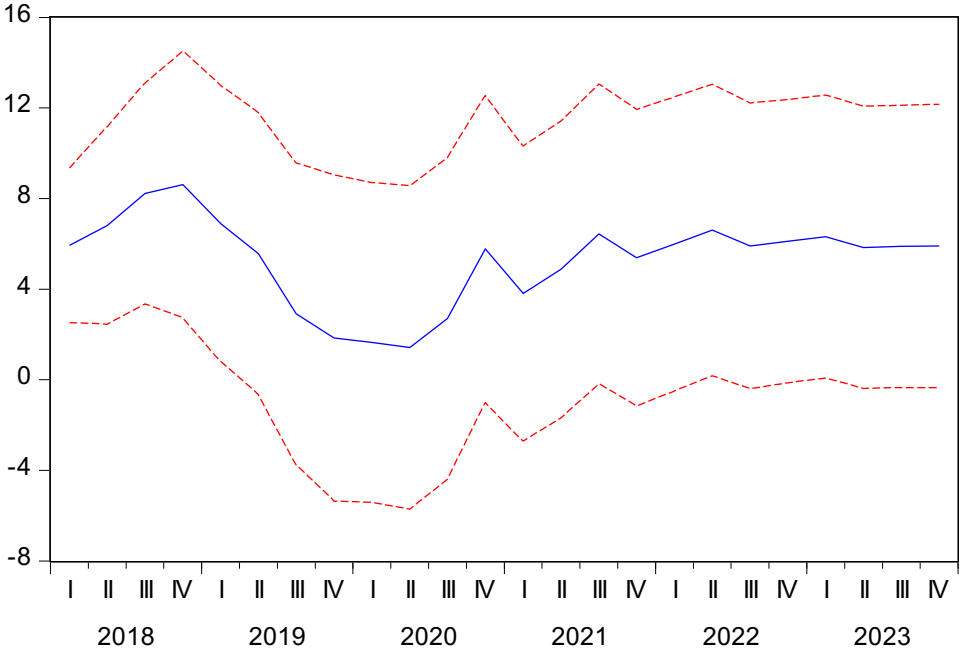
F-statistic	1.640140	Prob. F(7,47)	0.1476
Obs*R-squared	10.79759	Prob. Chi-Square(7)	0.1477
Scaled explained SS	10.35860	Prob. Chi-Square(7)	0.1691

Annex 7: Dynamic forecast of inflation rate

Favorable scenario



Unfavorable scenario



Annex 8: Econometric equation of Monetary Policy Rate, forecast and econometric tests

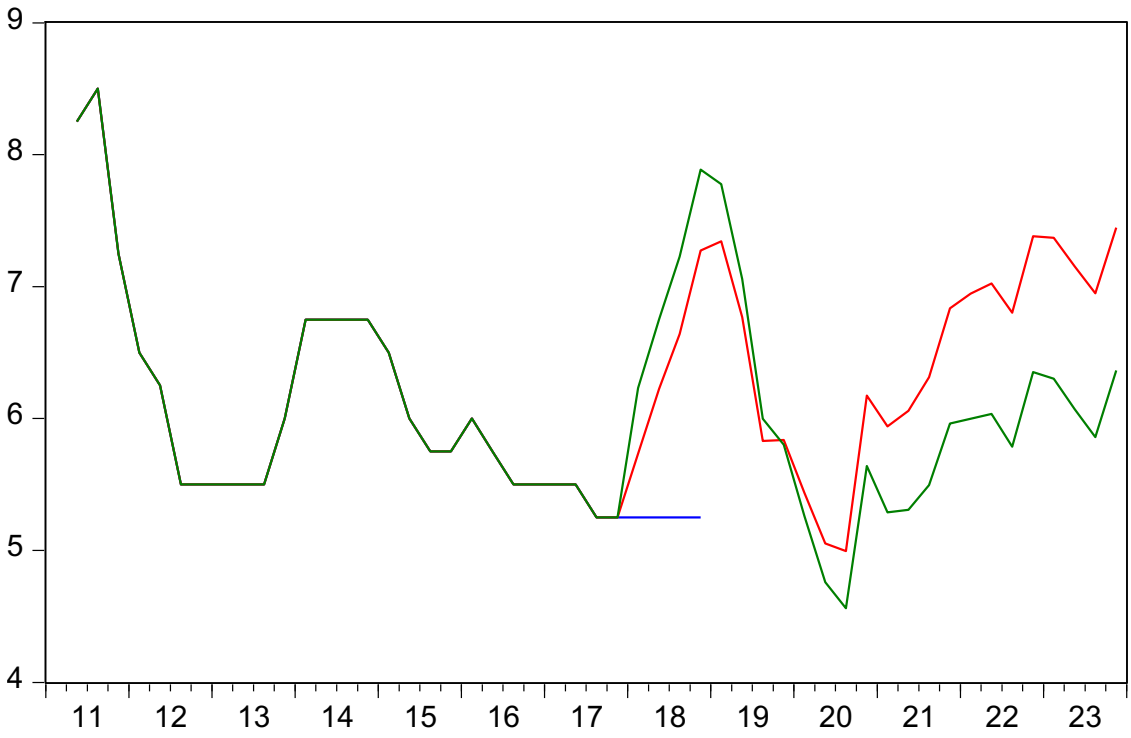
Econometric equation

Dependent Variable: Monetary Policy Rate (MPR)
Method: Least Squares
Sample (adjusted): 2011Q3 2018Q4
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Inflation-Inflation target	0.137039	0.038310	3.577057	0.0015
GDPGAP	3.451665	1.709053	2.019635	0.0543
MPR(-1)	0.898693	0.076787	11.70363	0.0000
Passive real rate(-1)	0.121229	0.046392	2.613157	0.0150
C	0.263727	0.519240	0.507910	0.6160

R-squared	0.877559	Mean dependent var	5.941667
Adjusted R-squared	0.857969	S.D. dependent var	0.750527
S.E. of regression	0.282851	Akaike info criterion	0.463220
Sum squared resid	2.000119	Schwarz criterion	0.696753
Log likelihood	-1.948294	Hannan-Quinn criter.	0.537929
F-statistic	44.79514	Durbin-Watson stat	1.432796
Prob(F-statistic)	0.000000		

Forecast

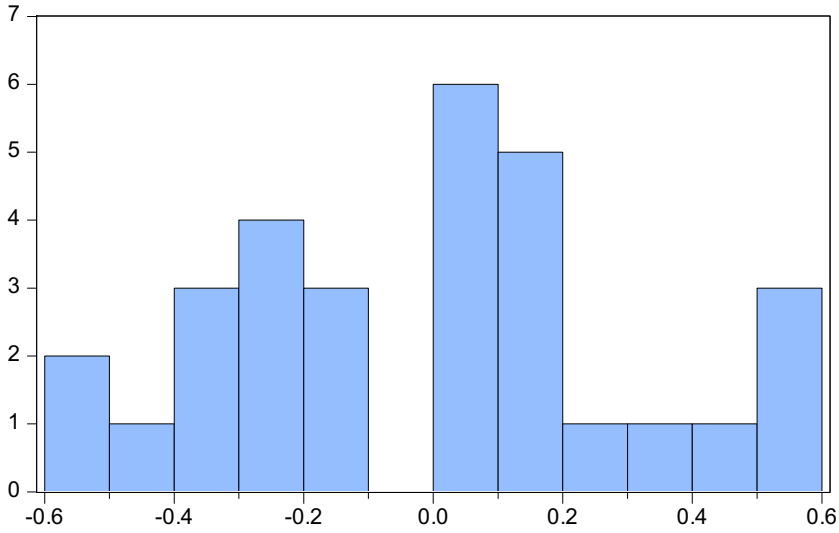


Favorable scenario Unfavorable scenario

Summary of econometric tests

Test	Name	Critic value	P-value	Result
Normality	Jarque-Bera	0.68	0.71	Normality
Serial Correlation	Breusch-Godfrey	0.60	0.70	No autocorrelation
Heteroskedasticity	Breusch-Pagan-Godfrey	8.31	0.08	Homoskedasticity

Normality test



Series: Residuals
Sample 2011Q3 2018Q4
Observations 30

Mean	-0.018125
Median	0.039187
Maximum	0.566473
Minimum	-0.583211
Std. Dev.	0.313857
Skewness	0.132276
Kurtosis	2.314310
Jarque-Bera	0.675197
Probability	0.713482

Serial correlation test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.595769	Prob. F(5,20)	0.7035
Obs*R-squared	11.71829	Prob. Chi-Square(5)	0.0389

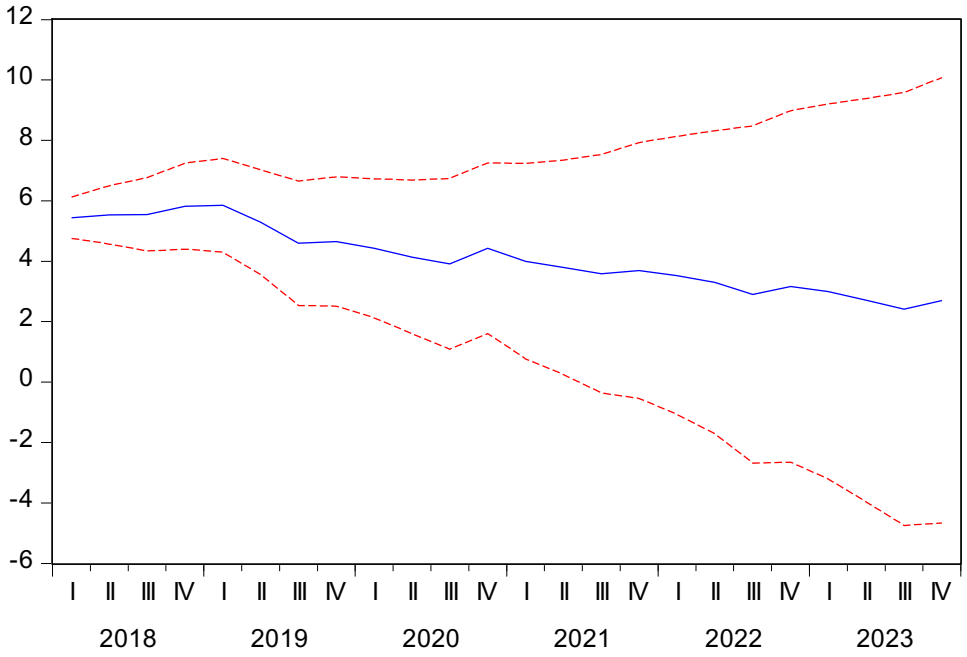
Heteroskedasticity test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.696495	Prob. F(4,25)	0.0538
Obs*R-squared	9.042072	Prob. Chi-Square(4)	0.0601
Scaled explained SS	8.306900	Prob. Chi-Square(4)	0.0810

Annex 9: Dynamic forecast of Monetary Policy Rate

Favorable scenario



Unfavorable scenario