Finance Research Letters 38 (2021) 101746

Contents lists available at ScienceDirect

Finance Research Letters

journal homepage: www.elsevier.com/locate/frl

# Overshooting of sovereign emerging eurobond yields in the context of COVID-19

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ARTICLE INFO

*JEL classifications:*
C33
F34
G01
G15

*Keywords:*
Overshooting
COVID-19
Yields to maturity
Emerging markets
Eurobonds
Announcements from international official creditors

ABSTRACT

This paper illustrates the phenomenon of overshooting yields on eurobonds issued by emerging and developing countries in the context of COVID-19. Using panel data from 48 emerging and developing countries, the results show that daily reports of confirmed cases have led to increases in yields and announcements of international creditor assistance to developing and emerging countries, which have calmed investor concerns.

## 1. Introduction

The COVID-19 pandemic is currently shaking the global economy and financial sectors worldwide. Significant negative impacts have already been seen in China, the first country to be exposed to COVID-19. Today, the pandemic is still spreading to other countries around the world. Financial markets have begun to react through the phenomena of flight to quality or flight to safer assets. According to Loayza and Pennings (2020), the flight to quality phenomena observed in international capital markets because of COVID-19 could make it difficult for emerging and developing countries to finance their budget deficits.

However, since the 2008 international financial crisis, emerging and developing countries have accelerated their issuance of Eurobonds in the international financial market. Access to the Eurobond market has been facilitated by the unprecedented drop-in key rates of major central banks (Federal Reserve, European Central Bank, Bank of Japan, and Bank of England), negative interest rates, and unconventional monetary policies (quantitative easing and forward guidance). In recent years, emerging and developing countries have been able to raise considerable amounts of money to finance their infrastructure at affordable rates. When the pandemic began to spread globally, risk premiums and yields significantly overreacted. However, when the International Monetary Fund (IMF), the World Bank, and the Paris Club announced support for troubled countries, yields turned in the opposite direction.

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https://doi.org/10.1016/j.frl.2020.101746
Received 26 May 2020; Received in revised form 17 August 2020; Accepted 1 September 2020
Available online 2 September 2020
1544-6123/

Numerous studies have focused on the market's response to public and private announcements. Ball and Brown (1968) were the first to measure the reaction of the US financial market to the results of a financial crisis. The description of overshooting in financial markets is not new. According to Howe (1986), the phenomenon dates back to Tulipmania in the 1630s. The phenomenon has already been observed in the foreign exchange market by Dornbush (1976) and in the US equity market by Howe (1986).

Recent studies have focused on the impact of COVID-19 on communities, businesses, and organizations around the world, as it inadvertently affects financial markets and the global economy. Goodell (2020) proposed future research agenda on the impact of COVID-19 on finance. His proposal focuses on the economic impact of the pandemic and its potential effects on the banking, insurance, and financial markets. Goodell's (2020) approach compares the potential effects of COVID-19 by drawing from large-scale events similar to the pandemic, such as the effect of widespread mood swings resulting from terrorist attacks on financial markets. Subsequently, much research has focused on the impact of COVID-19 on financial markets in developed and developing countries. Several studies have looked at the effects on stock markets (Akhtaruzzaman et al., 2020; Albulescu, 2020; Azimli, 2020; Bai et al., 2020; Cepoi, 2020; Goodell and Huynh, 2020; Ji et al., 2020; Okorie and Lin, 2020; Shehzad et al., 2020; Topcu and Gulal, 2020; Zaremba et al., 2020; Zhang et al., 2020). Others have analyzed the reactions of crypto-currencies and commodities markets (Conlon and McGee, 2020; Corbet et al., 2020; Goodell and Goutte, 2020; Mensi et al.,2020; Mnif et al., 2020; Sharif et al., 2020; Yarovaya et al., 2020).

However, to the best of our knowledge, no study has thus far examined the impact of announcements by international public creditors on the behavior of sovereign yields in the Eurobond market. Our study attempts to address this research gap. Our estimates show that announcements of assistance by international creditors to developing and emerging countries calmed the concerns of investors.

The rest of the paper is structured as follows. Section 2 outlines the methodology. Section 3 presents and analyzes the main results, and Section 4 summarizes the main conclusions.

## 2. Methodology

### 2.1. The model

This study uses the panel VAR (PVAR) methodology developed by Abrigo and Love (2016); we considered their proposed fixed-effects PVAR model as follows:

$$Y_{i,t} = Y_{i,\ t-1}A_1 + Y_{i,t-2}A_2 + Y_{i,t-p+1}A_{p-1} + Y_{i,t-p}A_p + X_{i,t}B + \mu_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$i \in \{1,2,...,N\}\ ;\ t \in \{1,2,...,T\}$$

$$i \in \{1,2,...,N\}\ ;\ t \in \{1,2,...,T_i\},$$

where $Y_{it}$ is a $(1xk)$ vector of dependent variables; $X_{it}$ is a $(1xl)$ vector of exogenous covariates; and $u_i$ and $e_{it}$ are $(1xk)$ vectors of dependent variable-specific panel fixed-effects and idiosyncratic errors, respectively.

The variables of eq.1 are as follows:

$$Y_{i,t} = \left[ytm_{i,t}, covid\_19_{i,t}, vix_{i,t}, ust_{i,t}, ann_{i,t};\right]$$

$$\varepsilon_{i,t} = \left[\varepsilon_{i,t}^{ytm}, \varepsilon_{i,t}^{covid\_19}, \varepsilon_{i,t}^{vix}, \varepsilon_{i,t}^{ann}, \varepsilon_{i,t}^{ust}\right],$$

where $ytm_{i,t}$ denotes the yield to maturity of sovereign bonds in secondary markets, and $covid\_19_{i,t}$ is the number of confirmed COVID-19 cases in country i at period t. Johns Hopkins University have set up reporting and monitoring systems for the pandemic worldwide. $vix_{i,t}$ denotes The Chicago Board Options Exchange Volatility Index (vix), which was introduced to control the impact of investor appetite on sovereign yields, and$ann_{i,t}$ denotes the news from international creditors. $ann_{i,t}$ is a dummy variable that takes a value of 1 if there is an announcement from creditors in favor of emerging or frontier countries, and$ust_{i,t}$ is US Ten Year Treasury Yield (Senga et al., 2018 have used this variable in the case of developing countries to capture the influence of liquidity and monetary conditions).

### 2.2. Panel unit root tests and estimation method

Modeling a PVAR requires stationarity tests beforehand. There is extensive literature on panel unit root testing, which Mignon and Hurlin (2005) synthesized, and they exposed the first- and second-generation tests. In this paper, we will propose the cross-sectional dependence test that was developed by Pesaran (2004) before choosing the type of test. If cross-sectional dependencies are verified, second-generation tests (CIPS or PESCADF) will be offered; if they are not verified, we will limit testing to first-generation tests (i.e., Im et al., 2003 and Levin et al., 2002).

After the eq1. transformation, Abrigo and Love (2016) consider that the Generalized Method of Moment (GMM) estimator can be represented as follows:

$$\mathrm{A} = \left(\overline{\mathrm{Y}^{*}}' \mathrm{Z}\widehat{\mathrm{W}}\mathrm{Z}'\overline{\mathrm{Y}}^{*}\right)^{-1}\left(\overline{\mathrm{Y}^{*}}' \mathrm{Z}\widehat{\mathrm{W}}\mathrm{Z}'\overline{\mathrm{Y}}^{*}\right), \quad (2)$$

**Table 1**
Summary statistics.

| Variable | Definition | Obs | Mean | Min | Max |
|---|---|---|---|---|---|
| ytm | Yield to maturity of Sovereign Bonds (%) | 3072 | 9.73 | -0.24 | 116.26 |
| cc | COVID_19 Confirmed Cases (number) | 3072 | 19803 | 0 | 955377 |
| vix | Chicago Board Options Exchange Volatility Index (index) | 3072 | 40.73 | 24.52 | 82.69 |
| ust | US Ten Year Treasury Yield (%) | 3072 | 0.72 | 0.54 | 1.18 |
| ann | News from international creditors dummy (0 or 1) | 3072 | 0.03 | 0 | 1 |

Notes: The table summarizes the descriptive statistics of the daily data of the various variables in our sample. The table includes the number of observations, the average, the minimum, and the maximum. Subsequently, for the need of estimates, the variable ytm and ust will be expressed in percentage, and the variables cc and vix will be expressed in logarithm.

**Table 2**
General diagnostic tests for cross-sectional dependence in panels (Pesaran, 2004).

| Variables | CD-Test | p-value | Average Joint T | Mean(r) | Mean abs(r) |
|---|---|---|---|---|---|
| ytmd | 162.32 | 0.000 | 64.00 | 0.60 | 0.61 |
| lcc | 252.61 | 0.000 | 64.00 | 0.94 | 0.94 |
| lvix | 268.68 | 0.000 | 64.00 | 1.00 | 1.00 |
| ustd | 268.68 | 0.000 | 64.00 | 1.00 | 1.00 |

Notes: Under the null hypothesis of cross-sectional independence, CD~N(0,1) and a p-value close to zero indicate data that are correlated across panel groups. CD means cross-sectional dependence statistic; ytmd denotes ytm divided by 100; lcc denotes log (cc); lvix denotes log (vix), and ustd denotes ust divided by 100.

**Table 3**
Panel unit root tests on the level of variables using CIPS, PESCADF and ADF.

| Variables | lcc | ytmd | lvix | ustd |
|---|---|---|---|---|
| t_stat | -5.69 | -2.81 | -3.54 | -3.56 |
| Critical value at | | | | |
| 10% | -2.05 | -2.05 | -4.12 | -4.12 |
| 5% | -2.12 | -2.12 | -3.48 | -3.48 |
| 1% | -2.23 | -2.23 | -3.17 | -3.17 |

Notes: $H_0$ = homogeneous non-stationarity; bi = 0 for all I; and t_stat denotes CIPS for ytmd, PESCDAF for lcc, and ADF for lvix and ustd. ADF tests are used for lvix and ust because they are variables common to all countries included in the panel.

**Table 4**
Results from the panel VAR.

| Variables | ytmd | lcc | lvix | utsd | ann |
|---|---|---|---|---|---|
| L.ytmd | 0.989*** | -0.788*** | -0.661*** | -0.00383*** | -0.257*** |
| | (0.0144) | (0.0981) | (0.0706) | (0.000532) | (0.0661) |
| L.lcc | 0.00125*** | 0.938*** | -0.0237*** | -0.000115*** | 0.00232 |
| | (0.000313) | (0.00398) | (0.00196) | (1.51e-05) | (0.00145) |
| L.lvix | 0.0111*** | -0.183*** | 0.829*** | -0.000108 | 0.0868*** |
| | (0.00155) | (0.0198) | (0.00792) | (8.56e-05) | (0.00920) |
| L.ustd | 2.008*** | 14.18*** | 43.39*** | 0.637*** | -14.48*** |
| | (0.323) | (1.898) | (2.058) | (0.0130) | (1.061) |
| L.ann | -0.00813*** | 0.0651*** | -0.0992*** | 0.000549*** | 0.493*** |
| | (0.00127) | (0.0114) | (0.0126) | (4.49e-05) | (0.0417) |
| Observations | 2,971 | 2,971 | 2,971 | 2,971 | 2,971 |
| Number of countries | 48 | | | | |

Notes: Standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$ The PVAR model is estimated by a fixed-effect GMM, accounting for lags and using logarithm results in data losses on the temporal dimension. The number of lags is equal to 1 for the PVAR and 2 for the instruments; the estimates cause the sample to lose 48 * 2 = 96 points. The lcc variable leads to a loss of 5 points (see the descriptive statistics with a minimum of 0). Finally, for the PVAR estimate, the number of observations is 3072 - 96 - 5 = 2971.

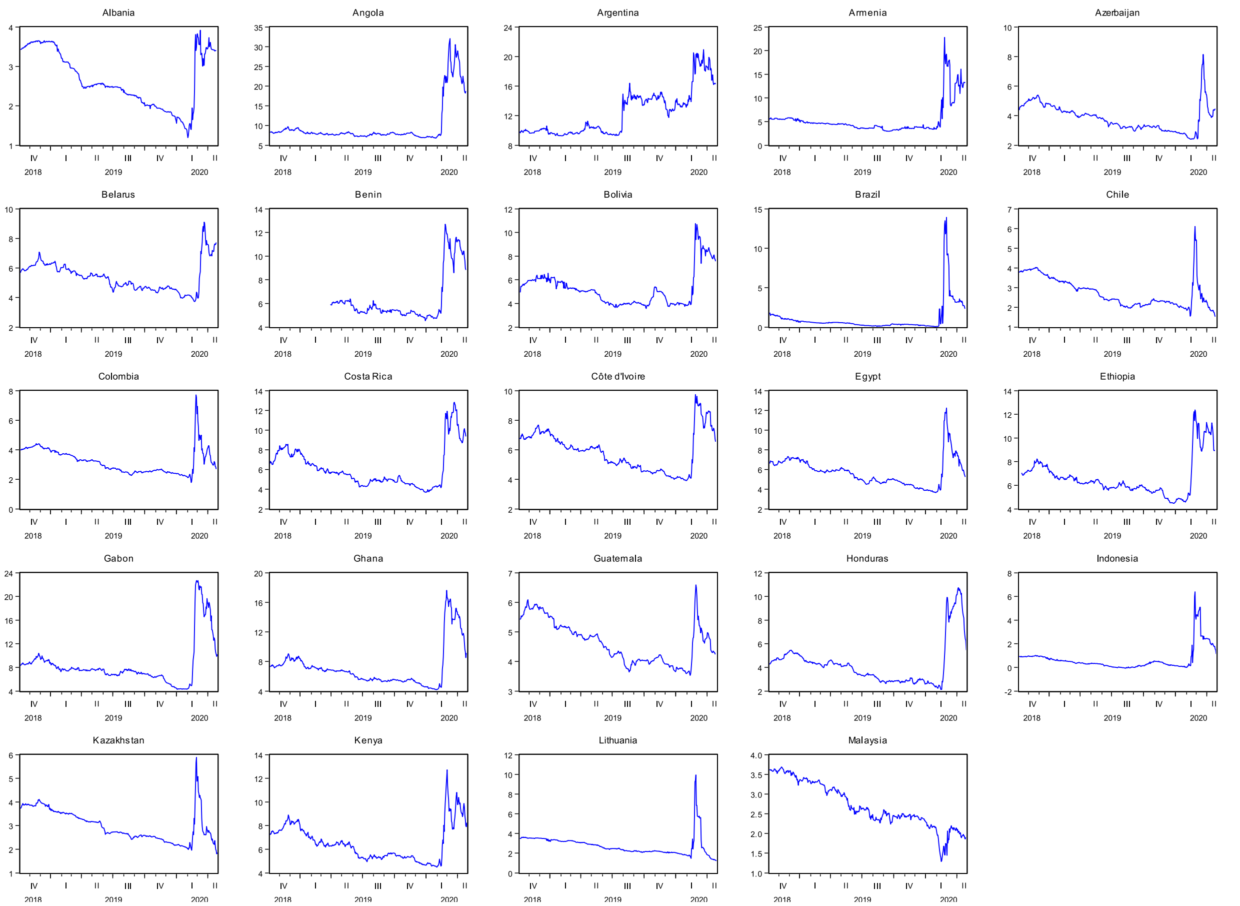


**Fig. 1.** Panel A - Overreaction of sovereign bond yields in secondary markets.

with $\widehat{W}$ the supposedly non-singular, symmetrical, and positive, $Z_{it}$ denotes row vectors.

## 3. Empirical results and discussions

The financial dataset that is used in this paper is taken from the Cbonds and Thomson Reuters databases. It covers emerging and frontier markets, which have issues on the international eurobond market. The COVID-19 daily pandemic series from Johns Hopkins University (Center for Systems Science and Engineering). News of international creditors is taken from official internet websites. The time period ranges from March 03, 2020 to June 04, 2020, and the frequency is daily. Our balanced panel is based on 48 emerging and developing countries (see appendix) whose sovereign bonds are in the secondary markets of Frankfurt, Luxembourg, Stuttgart, and Berlin. The combination of time and individual dimensions provide 3,072 observations. Summary statistics are reported in Table 1.

In Table 2, we report the results of Pesaran's (2004) cross-sectional dependence tests. For all variables (ytmd, lcc, lvix, and ust), we fail to reject the null hypothesis of cross-sectional independence in favor of dependence across panel groups. With all p-values equal to zero, the alternative hypothesis of cross-sectional dependence is accepted. We have strong evidence of cross-sectional dependence when following Pesaran (2007) or CIPS; therefore, it is reasonable to proceed to second-generation stationarity tests. We can now consider the second-generation panel unit root tests. These tests consider cross-sectional dependence (Table 3). The general condition for applying the Pesaran CIPS test is that the panel must be balanced. When we change the scale at the variable level, as shown at the bottom of Table 1, the variables ytmd, lvix, and ust remain balanced, while lcc is no longer balanced. As part of the latter variable, we propose the Pesaran (2012) unit root test or PESCADF. The results of the stationarity tests in Table 3 show that lcc and ytmd are stationary in the strongest sense of the term at a threshold of 1%. However, the value obtained for ADF statistics is close to the 10% threshold. We can therefore accept stationarity for lvix and ustd at a threshold of 10%. With the variables being stationary, a PVAR model can be estimated.

In Table 4, we report the results of the PVAR model estimates, which indicate that the coefficients of all the variables are significant at a threshold of 1%. The significance and the signs obtained for the variables lvix and ustd can be explained by the observed situation of uncertainty. The sense of risk aversion increased sharply as the pandemic began to gain momentum. Similarly, the slight rise in U.S. interest rates led to an increase in risk premiums for emerging countries and materializes a flight to U.S. sovereign bonds to the

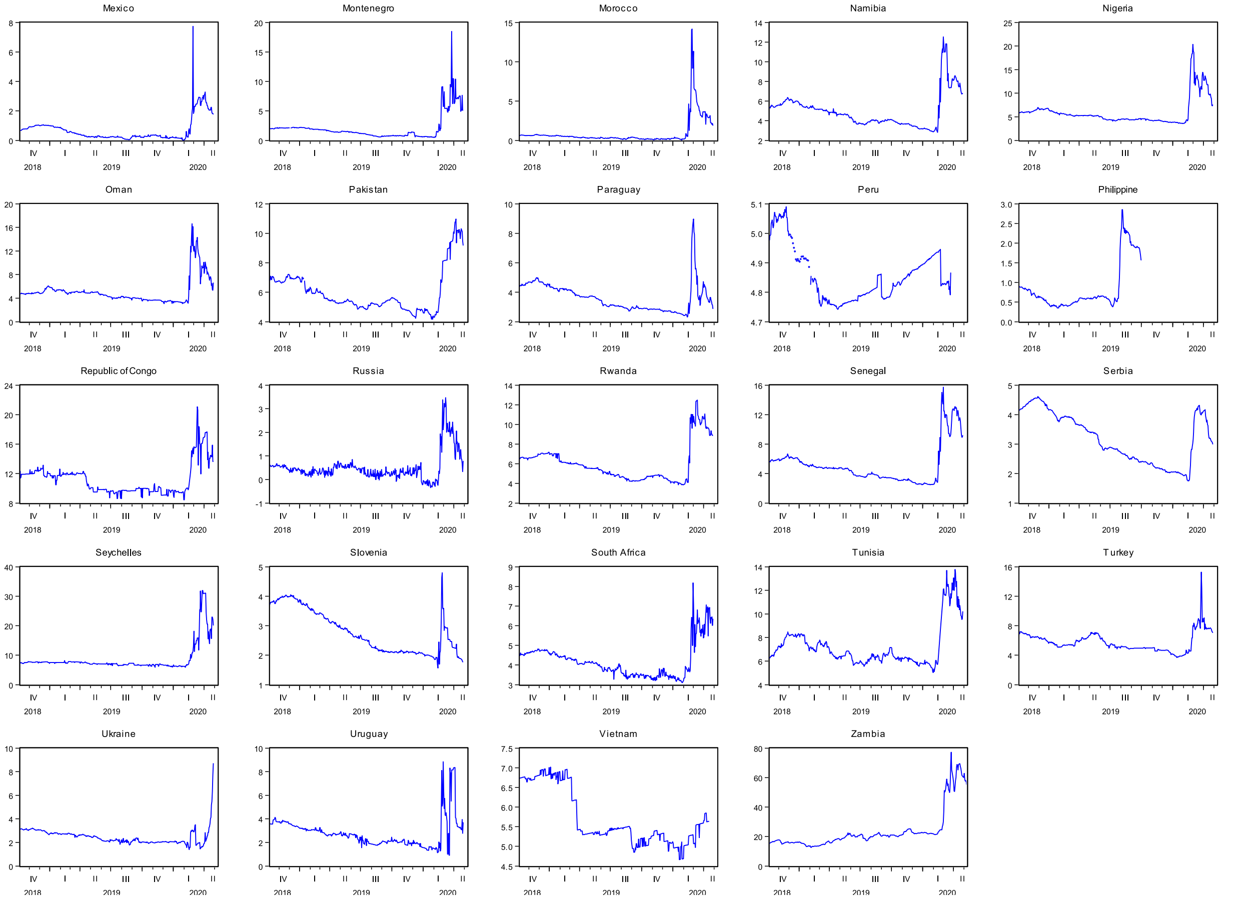


**Fig. 2.** Panel B - Overreaction of sovereign bond yields in secondary markets.

detriment of emerging market securities. The lcc coefficient is positive and confirms the stylized facts related to the current COVID-19 pandemic. When the pandemic began to spread globally, yields on sovereign securities in developing and emerging countries overreacted. Yields at maturity have either doubled or increased more than proportionally. This is due to the flight to quality phenomena of investors in secondary markets of public securities. Given the uncertainty created by the health crisis and the current and projected economic conditions in developing and emerging countries, which have deteriorated, investors have preferred to dispose of their securities and fall on the securities of developed countries, such as Germany or the U.S. This situation helps explain the first phase of the overshooting phenomena, where yields have risen sharply. This behavior of flight to quality by investors related to COVID-19 has already been described by Loayza and Pennings (2020) and Hausmann (2020) in the context of developing countries.

An analysis of Figs. 1 and 2 in the appendix allows us to observe the phenomena of overreaction of sovereign bond yields from March 2020 onward. It is precisely on this date that the pandemic began to spread globally. To obtain a better view of the phenomena, we have constructed figures over a two-year span. The second phase of the overshooting phenomena is explained by the sign of the variable ann, which is negative. Announcements of support from international creditors, such as the IMF, the World Bank, and the Paris Club, have temporarily calmed secondary markets. After the peaks were observed, yields then declined. The announcements of international creditors relate to debt moratoriums and emergency credit facilities that were granted to certain countries. Financial markets welcomed the global actions. However, while the announcement effects of creditors have somewhat calmed the markets, the level of sovereign yields in developing and emerging countries remains high. They have not returned to their original levels, as shown in Fig 3.

## 4. Conclusion

This study has examined the overshooting of sovereign emerging Eurobond yields in the context of COVID-19. Data covering emerging/developing countries and COVID-19 and announcements from international public creditors have had significant effects on sovereign bond yields with opposite behaviors. Our findings have economic policy implications. Developing and emerging countries need to diversify their debt portfolios in order to cope with possible shocks in the Eurobond market.

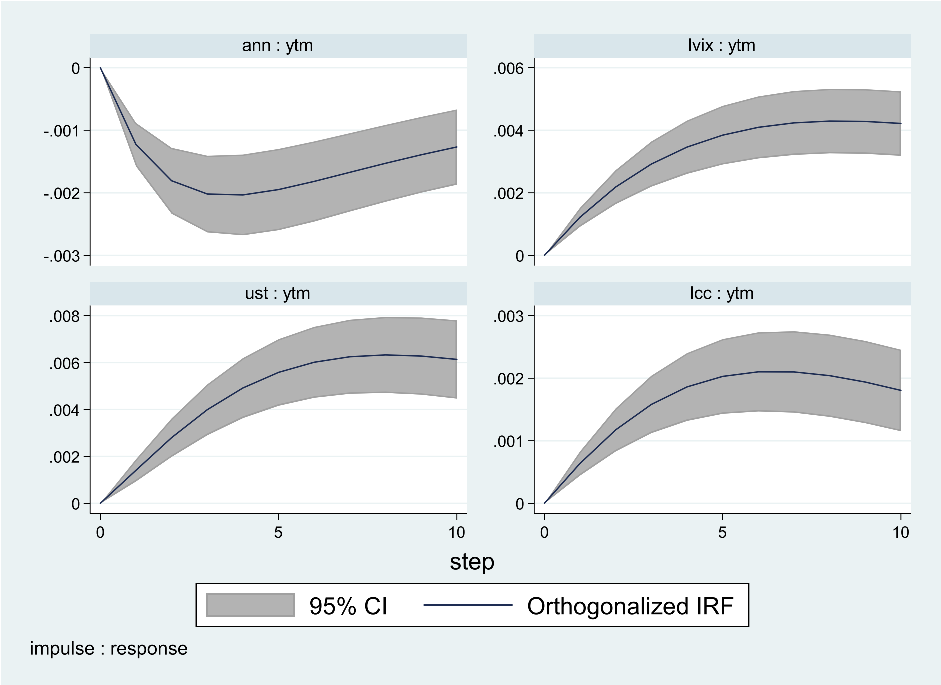


**Fig. 3.** Impulse response function.

## CRediT authorship contribution statement

**Babacar Sène:** Conceptualization, Data curation, Investigation, Methodology, Resources, Software, Supervision, Writing - original draft, Writing - review & editing. **Mohamed Lamine Mbengue:** Methodology, Formal analysis, Investigation, Software, Writing - original draft. **Mouhamad M. Allaya:** Data curation, Investigation, Visualization, Software, Writing - original draft.

## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.frl.2020.101746.

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