Reply to Referee 1

We wish to thank the referee for his/her detailed and useful comments.the revised version will carefully address all comments. nevertheless we want to highlight some point about our analysis and its main strengths.

1 contribution of the paper potentially significant?

Although research of this type has been done in the past, its contribution potentially lies in its empirical value for the country explored. Unfortunately, the authors do not provide us with enough detail, or motivation, to see this potential contribution. For example, they do not even give information on the country they are investigating, its monetary policy or exchange rate regime. If the focus moves to the specific monetary system they are exploring, potentially there is contribution, but this calls for further empirical work.

1.1 ***Answer***

The estimated model presented in the paper is especially relevant in studying the vulnerability of an small open economies like Tunisia characterized by high non linear dynamics due to the presence of financial frictions.Tunisia is a small open economy with a relatively high degree of regulation of various markets,structural inefficiencies in the Bankruptcy and Collateral Regime, conducting discretional and eclectic monetary policy with seemingly dominating elements of real exchange rate targeting, but using also interest rate.

This is a complex toolkit serving not only or maybe even not primarily inflation control, but also stability of the banking sector and real sector activity.

In theory, monetary policy can be transmitted through the economy in several channels: the bank credit, the exchange rate, the asset price, and the expectations channels.

our focus is on two main channels : asset price and exchange rate channels as trigggers of non linearities.

Hence,in such distorted Collateral Regime, the purpose of the paper, is to study to what extent a monetary policy would influence the tempo of economic activities in the country. how this policy affects real economic aggregates such as output.

1.2 why asset price and echange rate channel matter for Tunisia

Although several papers that study the endogeneity issue based on credit market conditions and business cycle fluctuations. the contribution potentially lies in its empirical value for the country explored.

it is well known that Tunisia's financial sector has been hostage to a distorted collateral regime. the weak bankruptcy procedures, enabling inefficient and crony firms[1] not to repay their debts and yet to survive instead of having to restructure or exit.

hence, while ordinary businesses struggle to gain access to finance, cronies have had easy access to finance (at convenient rates and low collateral or guarantees), which forced the credit institutions to mitigate their lending activities, and the risks incurred by lending to cronies, by demanding a high level of coverage by collateral.

[1] the most visible evidence of these practices regards the loans granted to the family of Ben Ali.

The exchange rate system in Tunisia is de jure managed float, but de facto, it is a peg to the basket of currencies dominated by the EURO. The aforementioned reluctance to use interest rate to stabilize inflation and output resulted in a very low variability of the policy rate and short-term money market rate.

by using monthly frequency (for the time span 1998M1 to 2015 M3),our data reflects several periods and take in account the conduct of monetary policy during the critical phase of transition after the Tunisian Revolution in 2011 and its reactions on asset price anc exchange rate(affected by political and social post-revolution instability).

The argument here is that official interest rates affect the market value and the income flows of certain categories of financial instruments and that these changes in wealth and interest income have an effect on aggregate expenditure, output, prices and the profitability of economic agents because they directly affect the balance sheet items of the accounts of companies. The process of the balance sheet channel shows how monetary policy affects the credit portfolio of financial intermediaries as well as other economic agents.This relationship is illustrated in the diagram below.

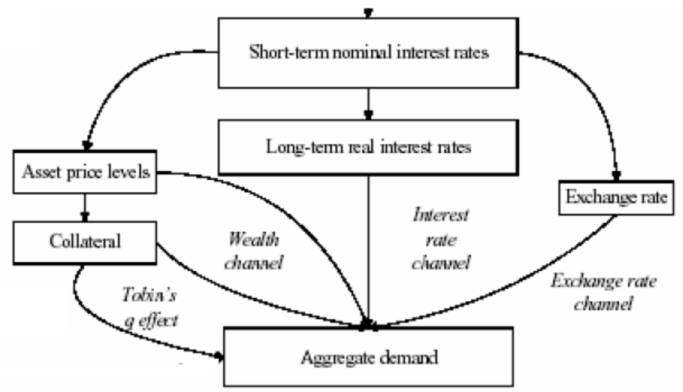

Fig. 1: BALANCE SHEET CHANNEL OF MONETARY POLICY TRANSMISSION

To do so, we identify to regimes: a binding and non-binding credit constraints and therefore non-linear effects could be observed via impulse response analysis in TVARs.

We define respectively, the two regimes by R1 and R2 where:

- R1 is the regime in which asset prices are low or exchange rates weak (depreciation regime); in this regime credit constraint is supposed to suddenly binds.
- R2 corresponds to the state of the economy where asset prices are high or, respectively, exchange rates are in a state of appreciation32 (Appreciation regime) indeed in this regime credit constraint are not binding.

Threshold models work by splitting the time series endogenously into different regimes. Each regime is defined by boundaries or threshold variable.

2 Is the analysis correct?

It is hard to say, as we do not get much information on the variables used or mechanisms that exist in the unknown country explored. It seems that the TVAR and the Hansen test are fairly done, but the GIRFs look puzzling. There is no mention of confidence intervals for GIRFs (nowhere in the whole manuscript) but still from the figures it appears that they have constructed them. The question is how, as this is not trivial. Also, when interpreting results, the authors do not take into account the significance of impulse responses, while from the figures it seems that these are not always statistically significant.

2.1 ***Answer:***

2.1.1 ***Algorithm for computation of GIRFs***

by using asset prices and exchange rates respectively as the switching variables. We use the econometric specification developed by (Balke 2000, Atanasova 2003, Li 2010). The model is specified as follows:

$$Y_t = \Psi_0^1 + \Psi_1^1(L)Y_{t-1} + \left(\Psi_0^2 + \Psi_1^2(L)Y_{t-1}\right) I\left(C_{t-d} > \gamma\right) + \epsilon_t$$

where

- Y_t a vector containing :
  - The industrial production index as a proxy of output.
  - Tunindex as a proxy of asset price developments.
  - The real effective exchange rate index (increase denotes appreciation).
  - for monetary policy variable we use the TMM as a proxy of the short-term nominal interest rate.
- $\psi_1^1 \psi_1^2$ are lag polynomial matrices.
- ϵ_t is the vector of disturbances with mean zero and covariance matrix $\sum$ .C_{t-d} is the threshold variable, which determines the prevailing regime of the system.
- γ is the threshold parameter at which the regime switching occurs.
- $I()$ is an indicator function that equals:
  - 1 when credit conditions cross the threshold i.e.
    $C_{t-d} > \gamma$.
  - 0 otherwise.

The method for computing generalised impulse response functions follows Koop, Pesaran and Potter (1996). GIRF is defined as the effect of a one-time shock on the forecast of variables in the model. The response of a variable following a shock must be compared against a baseline “no shock“ scenario.

A GIRF -similar to the notation of Koop et al. (1996) is defined as:

$$GIRF_y(h, \Omega_{t-1}, \mu_t) = E\left[y_{t+h}|\Omega_{t-1}, \mu_t\right] - E\left[y_{t+h}|\Omega_{t-1}\right]$$

where h is the forecasting horizon, Ω_{t-1} is the information set at time $t-1$ (i.e the initial values of the variables in the model) and μ_t is a particular realization of exogenous shocks. The following algorithm is employed:

1 A history Ω^r_{t-1} for all the variables is chosen depending on which regime is assumed; this means that a particular realization ω^r_{t-1} of the threshold variable is drawn randomly based upon the regime criterion. This history comprises all the lags up to order p of the variables in the VAR.

2 Shocks are drawn based on the variance-covariance matrix of the residuals. As a joint distribution of these shocks is assumed, a k-dimensional vector u^b_{t+h} is drawn at each horizon (where k denotes the number of endogenous variables in the VAR).

3 The future evolution of all variables is simulated using the estimated coefficients for both regimes as well as the shock process for $h+1$ periods. Hence, the model is allowed to switch regimes over the forecast horizon. The resulting sequence is denoted by $Y_{t+h}\left(\omega^r_{t-1}, \mu^b_{t+h}\right)$

4 Step 3 is repeated but the shock sequence at $t = 0$ is replaced by a shock of size δ_j for the variable j and the corresponding contemporaneous shocks for the other variables. This $k \times 1$ vector is denoted by μ^*_j.The resulting sequence is denoted by $Y_{t+h}\left(\omega^r_{t-1}, \mu^b_{t+h}, \mu^*_j\right)$

5 Steps 2 to 4 are repeated R times (here: R = 500) in order for the shocks to average out.

6 Steps 1 to 4 are repeated B times (here: B = 500) to obtain an average over the respective regime history and - once again - to iterate over a large number of draws of shock sequences which are expected to average out.

7 The GIRF is the difference between the simulated forecast assuming the shock μ^*_j and the forecast assuming no particular shock:

$$GIRF(h, \Omega_{t-1}, \mu^*_j) = \left[Y_{t+h}\left(\omega^r_{t-1}, \mu^b_{t+h}, \mu^*_j\right) - Y_{t+h}\left(\omega^r_{t-1}, \mu^b_{t+h}\right)\right] / (B \times R)$$

2.1.2 *Confidence bands for GIRFs*

Most papers which work with GIRFs do not compute confidence bands. Besides the absence of methodological work on this issue, the reason lies in the fact that the simulations of the GIRFs are already computationally quite intensive. Setting R = B = 1000 can take several hours - even when resorting to parallel computing to alleviate computation time. Adding bootstrap confidence bands with another 1000 simulation runs would thus be equivalent to a simulation with 10^5 repetitions. In the present paper, the number of simulation runs B and R were thus reduced for the calculation of confidence bands. our method for computing bootstrap confidence bands employs the following simple algorithm:

1 Artificial data is generated recursively using the estimated coefficients and errors from the TVAR structure.

2 Using the *recursive datatset*, the regression coefficients $\Psi_0^1, \Psi_1^1(L)$ and $\Psi_0^2, \Psi_1^2(L)$ as well as error terms are calculated from a TVAR assuming the threshold corresponds to the estimated value γ

3 Using *the original dataset*, but the coefficients and errors from step 2, GIRFs are calculated as described in the above algorithm for each particular combination of shocks and initial conditions.

4 Steps 1 to 3 are repeated S (here: S = 500) times to generate a sample distribution of the GIRFs from which confidence bands are drawn at the respective significance levels.

3 Main weaknesses

The paper is poorly written. Not just in terms of language, but the structure and clarity as well. From the introduction it is not clear what was done. The literature review spans over too many different topics which hardly relate to the specific topic explored in the paper. The paper therefore lacks focus and clarity. Sometimes the authors are sloppy as they do not describe the data, the country, they do not give any descriptive statistics, and they do not even mention confidence intervals. Regarding the latter, from the figures it seems they have constructed confidence intervals but they do not say how or even what those lines represent.

3.1 Answer

- in *terms of lacks focus and clarity* ,it's true the introduction seems hardly to understand, we will revise the introduction and literature review sections to gives readers more clarity about the specific topic explored.
- data and descriptive statistics will be described.