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REDISTRIBUTION EFFECT OF MONETARY POLICY EVIDENCE FROM BRAZIL

Full paper and code

Aishameriane Schmidt,.[1]; Guilherme Valle Moura.[2]
[1]Master Student, Economics. Federal University of Santa Catarina (UFSC).
[2]Professor, Department of Economics and International Relations. Federal University of Santa Catarina.

Contact:
aishameriane@gmail.com
http://github.com/aishameriane/esobe2018

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OUR QUESTIONS

Considering the Brazilian economy during the inflation target regime (2000-2018), we want to answer:

- Is there an effect of monetary policy shocks on the capital-labor ratio?
- Is the relationship between interest rates and capital-labor ratio stable?

The capital-labor ratio (K/L) is the quotient between the capital income and labor income, taken from tax declarations and available in a monthly basis by the Brazilian IRS.

WHY THIS IS IMPORTANT?

The aftermath of the 2008 economic crisis and the increase in income and wealth inequality intensified the discussion on the heterogeneity effects of monetary policy and its role on inequality. There are no empirical studies for Brazilian economy assessing the net effect of monetary policy through the wealth and income redistribution channels.

THE REDISTRIBUTION CHANNELS TO INCOME/WEALTH

It's hard to access beforehand what will be the aggregate effects of monetary policy through these channels, therefore empirical studies are necessary.

Income earnings composition

Interest rates will affect differently households who have more/less labor and capital income. Indirectly, interest rates can affect unemployment affecting those who depends more on wages.

Interest exposure channel

The effects of monetary policy on households will differ depending on the maturity of assets and liabilities. Heterogeneity occurs due to diferences between savers and borrowers regarding their assets and liabilities duration.

Inflation tax channel

Its effect is directly on the changes in the nominal prices as consequence of unexpected inflation. Real valued assets will mantain its value, while owners of nominal posessions will loose purchasing power.

METHODOLOGY

We are proposing an extension of Uhlig (1997) BVAR to a TVP-VAR framework. The state-space representation of the model is given by:

$$y_t = Z_t \cdot \beta_t + \epsilon_t, \quad \text{with} \quad \epsilon_t = \mathcal{U}(\Omega_t^{-1})'\xi_t \ \ and \ \xi_t \sim \mathcal{N}(0, \mathbb{I}_m)$$

$$\beta_t = \beta_{t-1} + u_t, \quad \text{with} \quad u_t \sim \mathcal{N}(0, Q^{-1})$$

$$\Omega_{t+1} = \frac{\mathcal{U}(\Omega_t)' \cdot \Theta_t \cdot \mathcal{U}(\Omega_t)}{\lambda} \quad \text{with} \quad \Theta \sim \mathcal{B}_m\left(\frac{\nu+c+p\cdot m}{2}, \frac{1}{2}\right)$$

$\mathcal{U}(\cdot)$ is the superior Cholesky decomposition; $\lambda > 0$ and $\nu > m-1$ are parameters; c is the number of deterministic regressors, p denote the lags and m the number of variables. The Θ's are assumed independent and $\mathcal{B}_m$ is the multivariate beta distribution.

We used p=2 lags, burn-in equal to 10.000 and results are based in 5.000 replications after burn-in.

Main blocks of the Gibbs Sampler

Obtaining filtered and smoothed trajectories for β_t's, Q, Ω_t's conditional to all other parameters

- β_t's: Carter and Kohn (1994).
- Q: Conjugate Wishart prior.
- Ω_t's: Windle and Carvalho (2014) – in closed formula.

RESULTS AND DISCUSSION

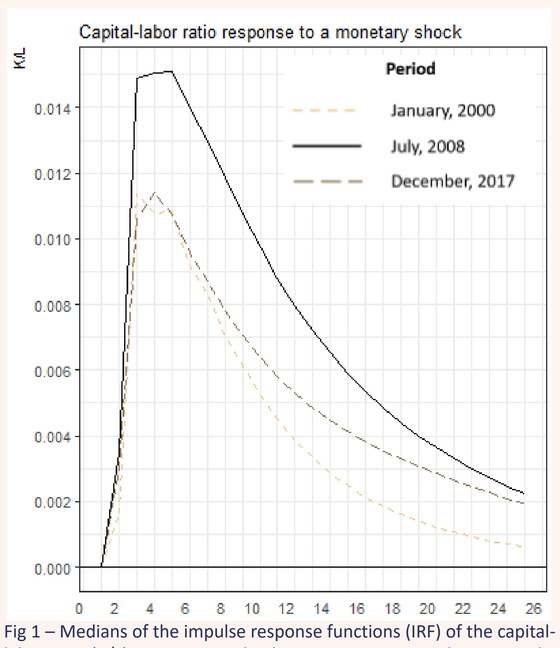


Fig 1 – Medians of the impulse response functions (IRF) of the capital-labor ratio (K/L) to monetary shocks at January, 2000; July, 2008 and December, 2017. For all three curves the interval does not include zero until the 15th month after the initial shock.

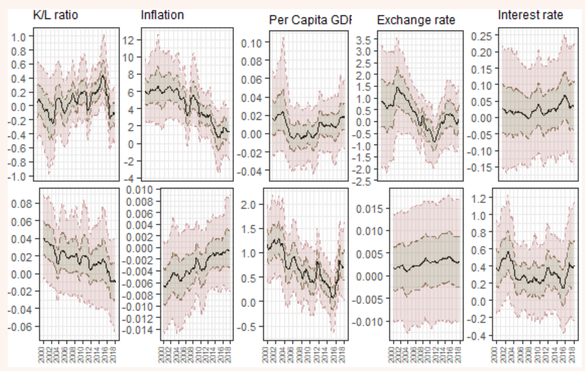


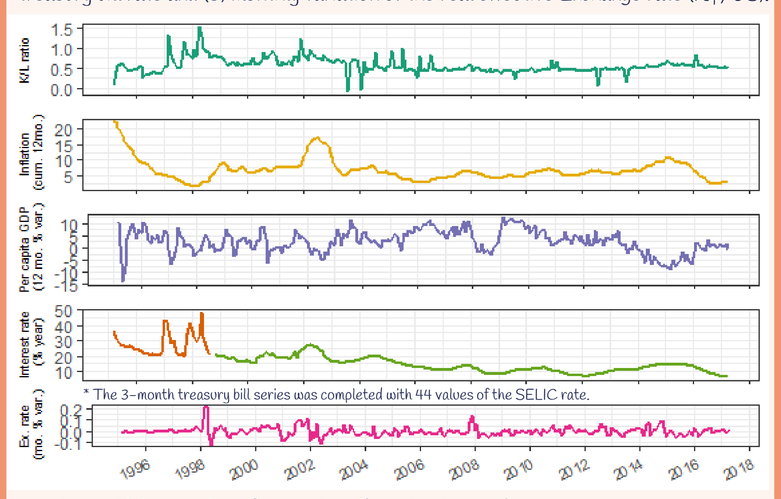
Fig 2 – Estimates for β along time of the variables in the capital-labor ratio equation. Top line has the coefficients of the first lag and the second line has the second-lag coefficients. The central line is the median, the darker inner area corresponds to the 25%-75% region and light area is the 5%-95% region based on 5.000 Gibbs Sampler repetitions.

A 1% shock in the interest rate affects the capital-labor ratio significatively and the effects lasts for at least 15 months after the initial shock. Our results show that a contractionary monetary shock increases K/L, i.e., the net effect is a shift from the labor income to the capital income. It is important to notice that since our data is from taxes, this result is most likely underestimating the real effects because people in the lowest deciles of income are exempt of the tax declaration (given that they do not have financial/real assets).

This relationship proved to be stable considering different model specifications and it is most likely to happen due to the stable composition of capital income (between dividends, profits, rents, etc) in the last 20 years. The other coefficients in the K/L equation also appear to be temporaly stable with exception of the inflation rate. However, the analysis of all the model coefficients β's shows that some of them are time varying, suggesting that we could benefit from shrinkage methods in the prior in order to obtain better estimates.

DATA

We used 5 series in the model: (1) Capital-Labor Ratio (%), (2) Inflation Index (acummulated in 12 months), (3) annual variation of Per Capita GDP, (4) 3-month treasury bill rate and (5) monthly variation of the real effective Exchange rate (R$/US).



Monthly series from Jan/96 to Mar/2018, treated for seasonality. The first 4 years were used to obtain the prior hyperparameters (through OLS) and are not part of the inflation target regime period.

MAIN REFERENCES

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