

TESTING HYPERINFLATION DATA AGAINST MAKOCHEKANWA'S MODEL (2007)

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JANUARY 22, 2023

- Hyperinflation under the Cagan definition is 50% monthly or just under 13,000% annually
- The hyperinflationary period under my data begins in March 2007 and ends at the end of our usable data and goes unmentioned in Makochekanwa's data
- The actual end of hyperinflation was in April 2009 with the dollarisation of the economy

Makochekanwa's Model

$$\begin{aligned}\log \text{INFL} = & \beta_0 + \beta_1(\log \text{M2}) + \beta_2(\log \text{Y}) + \\ & \beta_3(\log \text{PREM}) + \beta_4(\log(\text{INFL}(-1))) + \\ & \beta_5(\log \text{PR}) + \beta_6(\log \text{US_CPI}) + \beta_7(\log \text{NW})\end{aligned}$$

INFL = Zimbabwe's inflation rate

M2 = Money supply,

Y = Real GDP

PREM = Black market currency premium

INFL(-1) = Lagged inflation

PR = Freedom House Political Rights Index

US_CPI = American CPI

NW = Nominal Wage

Makochekanwa's Data

- February 1999 - December 2006
- Potential sources of error
- His calculation of PREM

$$\begin{aligned}\log Z = & \beta_0 + \beta_1(\text{RER}) + \beta_2(\log \text{IR}) + \beta_3(\log \text{INFL}) + \\ & \beta_4(\log Z(-1)) + \beta_5(\text{DEV}) + \\ & \beta_6(\log \text{M2}) + \beta_7(\log \text{NW}) + e_t\end{aligned}$$

Z = Black market premium

RER = Real exchange rate

IR = International reserves

INFL = Inflation rate

Z(-1) = Lagged black market premium

DEV = Expected rate of devaluation

M2 = Broad money supply

- Methods

- Augmented Dickey Fuller (ADF) for stationarity
- Engle-Granger (E-G) for cointegration
- Short Run Error Correction cointegration demonstrated in E-G testing
- Standard Granger-causality testing for causal relationships

- Results

- M2 and INFL have bi-directional Granger-causality
- PREM, INFL(-1), and PR Granger-cause INFL

Our Data

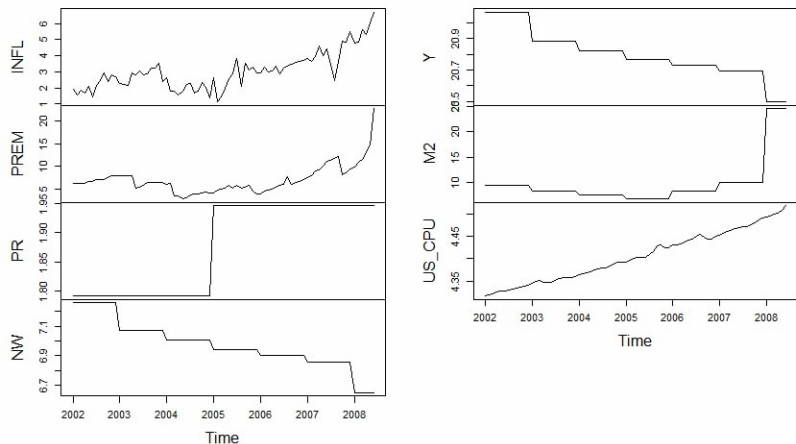


Figure: Plot of the logs of the directly measured variables

- Synthetic variables

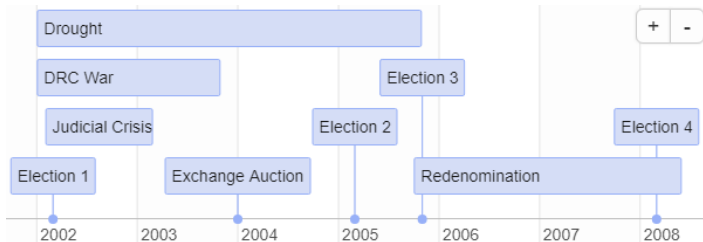


Figure: Timeline of the synthetic variables

- Potential sources of error

- Missing data for inflation (five points in mid-end of data)
- Calculating our PREM with

$$\left(\frac{BMR}{OMR} - 1 \right) \times 100\% = PREM$$

- Nominal wage estimator

- Augmented Dickey-Fuller
- Johansen
- Toda-Yamamoto Granger Causality without stationarity
 - Stability Testing with multivariate Portmanteau and Breusch-Godfrey tests
 - Develop augmented VAR($p + m$) model
 - INFL, PREM, PR, NW, M2, and DRC
 - Explicitly missing from augmented VAR - Y, US_CPI, and most synthetic variables
 - Test Granger Causality with Wald tests for first p variables

Our Methods

- Unused Methods
 - Instrumental Variable Analysis
 - Only two weak available instruments
 - Structural VAR
 - Stationarity of PREM

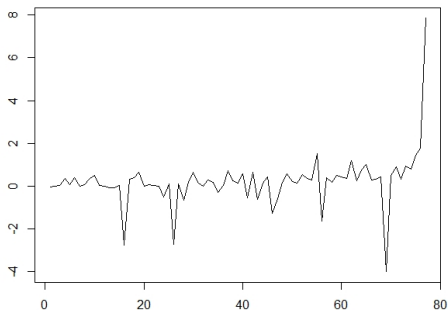


Figure: Plot of first differencing of $\log(\text{PREM})$

- PR, NW, M2, and the DRC war all Granger-cause INFL
- INFL, PR, NW, M2 Granger-cause PREM
- INFL and PREM Granger-cause M2
- Notice bi-directional Granger-causality of INFL and PREM with M2
- Similarities
 - M2 and INFL bi-directional Granger-causality
 - PR Granger-causes INFL

Thank you!

Continuation of this research would involve testing more hyperinflationary episodes and further inquiry into the impact of a black market rate.

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Thanks to Dr. Wayne Tarrant at Rose-Hulman Institute of Technology and Dr. Adugna Olani at Vanderbilt University for mentoring me and working with me to have success in my research, the NSF for funding my research under grant #1852132, and Dr. Tara McIndoe-Calder and the Central Bank of Ireland for providing me with black market rate data.