

Towards a general framework to construct and evaluate core inflation measures

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Outline

- 1 Motivation
- 2 Stylized facts
- 3 Brief methodological issues
- 4 Results
- 5 Takeaways

Motivation

- ① Headline m/m inflation is too volatile to be used as the main reference for short-term monetary policy decisions.
- ② **Excluding food and energy is a bad strategy.** Why?
 - Exclusion is fixed but supply shocks and measurement errors may affect non-excluded components.
 - The exclusion is **not optimal under any desirable criteria.**
 - Has **undesirable statistical properties.**
- ③ Thus, it is very usual at Central Banks to make **ad-hoc exclusions.** This is **also a bad practice** because:
 - Are evident only ex-post.
 - **Can seriously affect the statistical properties of the resulting aggregate,** which may be biased, little persistent, too volatile, unrelated with the output gap, etc.

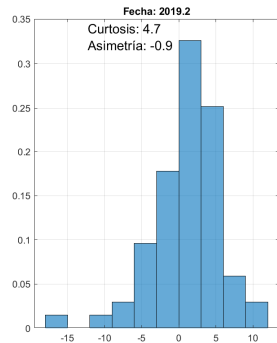
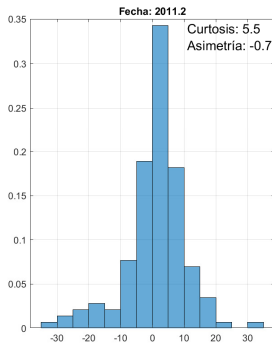
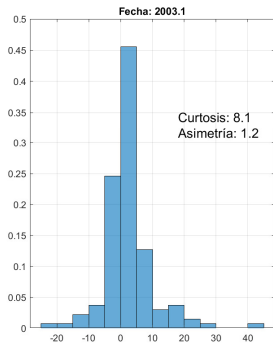
What we do

- 1 Document the bad properties of the CPI ex. food and energy (XFE) for five of countries: Chile, Colombia, Peru, US, and EA.
- 2 Focus on exclusion measures, propose a methodological alternative, and apply it for the data of the same countries.
 - Basic Idea: Loss function to synthesise desirable properties of core indicators.
 - Useful for both variable and fixed exclusion measures.

Stylized facts (case of Chile)

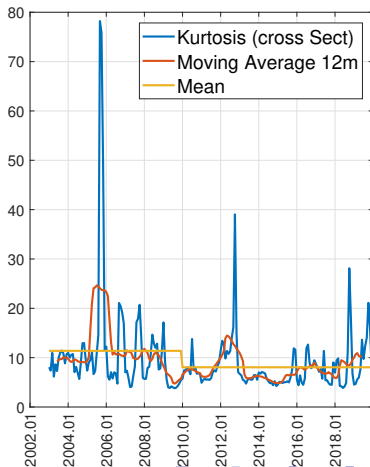
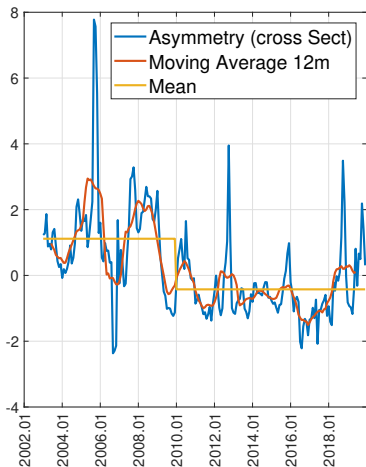
Cross-sectional distributions are leptokurtic, asymmetric and unstable

Cross-section m/m inflation (144 components) at three equidistant sample points.



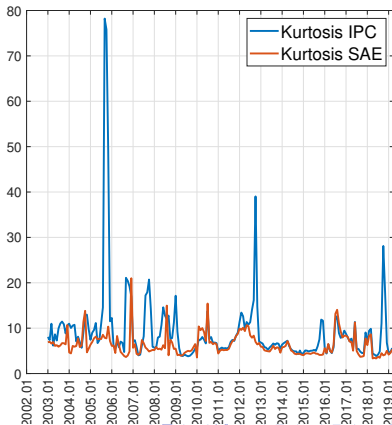
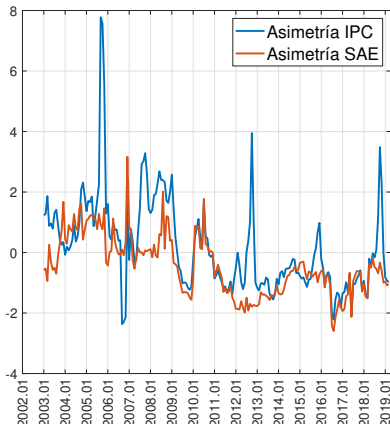
Stylized facts (case of Chile)

Cross-sectional distributions are leptokurtic, asymmetric and unstable



Cross-sectional distributions of the XFE (Chile)

The XFE eliminates the extreme events, but still shows significant instability.



Alternative core indicators

Measure	Abbreviation	Param. to choose	Fixed excl.
CPI without food and energy	<i>CPIXFE</i>	—	Yes
Median inflation	<i>Median</i>	—	No
Trimmed mean	<i>TM</i>	α_0, α_1	No
Trimmed mean by variance	<i>TMV</i>	α, h	No
Mean adjusted by variance	<i>MAV</i>	h	No
Optimal fixed exclusion	<i>OFE</i>	α_0	Yes

How to chose the parameters and assess the results

Looking at the statistical properties of the resulting indicator

We propose a loss function that combines five dimensions:

- Persistency (ρ)
- Volatility (σ)
- Bias (b)
- Predictive power (ϵ)
- Correlation with the output gap (ϕ)

How to choose the parameters and assess the results

Combine the desirable properties in a single "objective" measure

The aim is to carry out in a systematic and "optimal" way, what is usually done in an ad-hoc fashion.

- The loss function: $L_i = V_i \times W \times V_i$,
- vector V gathers the distance of each of the five dimensions to its desired value:
 - $V_i = [(\rho_i - \rho_0), (\sigma_i - \sigma_0), (\mathbf{b}_i - b_0), (\epsilon_i - \epsilon_0), (\phi_i - \phi_0)]$
- In the paper, W is diagonal with $w_1 = w_2 = w_3 = w_4 = 1$, and $w_5 = 0$.
- In practice, the weighting matrix can be defined by the policy makers.

General findings for the five countries

CPIXE is a bad core inflation measure

- CPIXFE is remarkably biased and less persistent than headline CPI.
- CPIXFE is substantially more volatile, biased, and less persistent than other alternatives, and tends to have low forecasting power.
- Variable exclusion measures, such as TM, TMV, and our optimal fixed exclusion measure, OFE, tend to be among the best performers.

General findings for the five countries

Our OFE shows good properties and it is easy to communicate

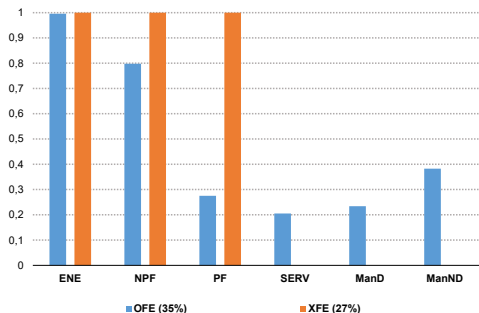
- Despite being a fixed exclusion measure, our OFE tends to be located close to the top of the ranking, far above the CPIXFE.
- It tends to be easier for Central Banks to communicate fixed exclusion inflation measures.
- OFE is the currently preferred measure at the CBCh and is regularly published by the Statistics National institute, together with headline CPI.

Classification of the 144 components of the Chilean CPI into 6 categories

	Q	Share
SERV	33.3%	41.2%
ManD	26.4%	14.5%
AP	16.7%	21.2%
ANP	12.5%	8.8%
ManND	6.9%	7.0%
ENE	4.2%	7.3%

Trimming proportions by category

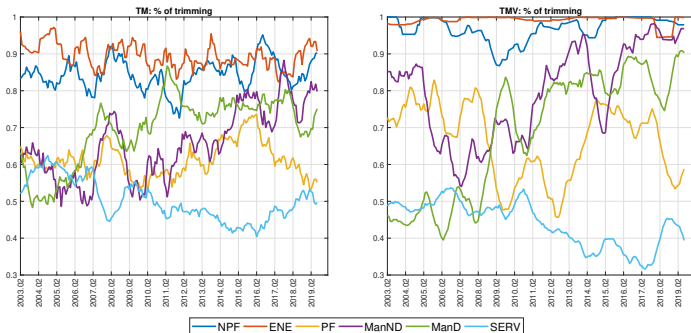
OFE and CPIXFE Chile



- The OFE and the CPIXFE trim high proportions of ENE and NPF.
- However, **the CPIXFE excludes components that should be maintained (PF) and keeps others that should be trimmed (ManD).**
- The OFE, preserves the trimming structure of the variable excl. measures.

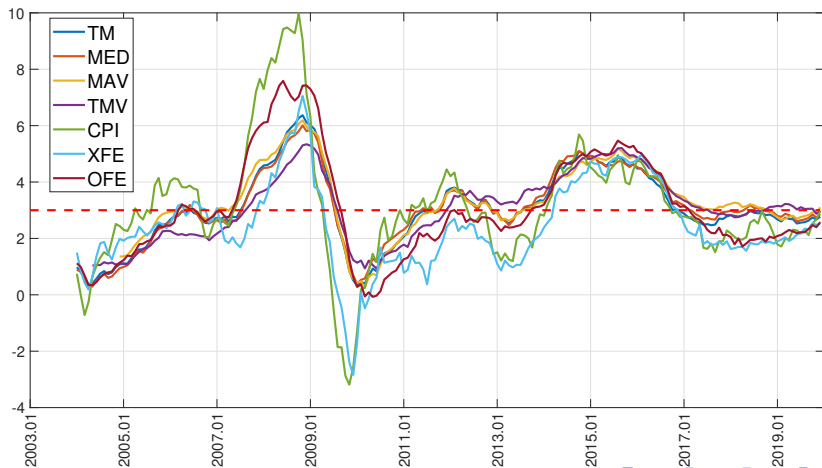
Results of the variable trimming - Chile

Proportion of the trimmed weight by category (12-month mov. av.)

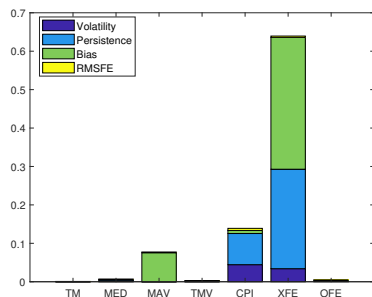


- We trim almost all of ENE and NPF
- Core = SERV + some goods and PF

Our core measures deliver different signals in comparison to the XFE



Comparison of all Core measures - Chile

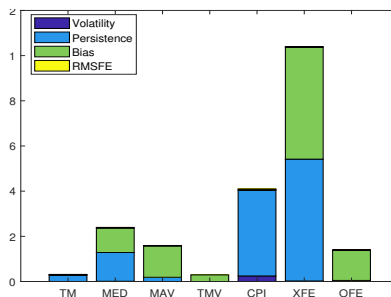


	ρ	σ	$\mu - \mu_0$	RMSFE	L
TM	0.74	0.10	0.01	0.35	0.08
TMV	0.72	0.09	0.03	0.37	0.32
OFE	0.70	0.14	0.03	0.33	0.49
MED	0.68	0.11	0.04	0.37	0.71
MAV	0.74	0.09	0.27	0.37	7.74
CPI	0.46	0.30	0.09	0.40	13.90
XFE	0.23	0.27	-0.59	0.39	63.94

- Variable exclusion measures at the top of the ranking.
- CPI and XFE unable to generate high persistence.
- Our OFE can perform as good as the variable excl. measures.
- **Low rank of XFE does not depend on the weighting matrix.**

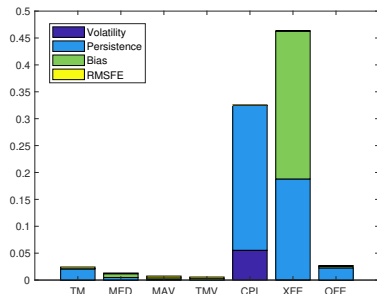
Comparison of all Core measures - Peru

54 components that add up to the CPI



	ρ	σ	$\mu - \mu_0$	RMSFE	L
TMV	0.05	0.77	-0.17	0.26	0.03
TM	0.07	0.6	0.01	0.31	0.03
OFE	0.06	0.7	-0.37	0.31	0.14
MAV	0.06	0.63	-0.37	0.31	0.16
MED	0.08	0.41	-0.33	0.32	0.24
CPI	0.21	0.15	0.03	0.33	0.41
XFE	0.1	0.03	-0.7	0.32	1.04

Comparison of all Core measures - US



	ρ	σ	$\mu - \mu_0$	RMSFE	L
MAV	0.80	0.04	0.01	0.40	0.01
TMV	0.75	0.04	-0.03	0.39	0.26
MED	0.77	0.05	-0.08	0.43	0.78
TM	0.68	0.05	-0.01	0.45	1.32
OFE	0.69	0.04	0.05	0.44	1.47
CPI	0.32	0.28	0.01	0.40	28.40
XFE	0.40	0.06	-0.52	0.42	42.92

Takeaways

Nothing is lost and much is to be gained by optimally selecting the excluded items instead of sticking with the usual adhoc criteria.

- There is a simple way to do in a systematic, objective, and accountable way, what CBs usually do in an adhoc and sometimes misguided fashion.
- Improvements in the quality of core measures can be substantial.
- CPIXFE has quite poor statistical properties: It is biased, volatile, and has low persistence and low forecasting power.
- In some cases headline CPI is a better core indicator than the CPIXFE.
- Our strategy also leads to exclusions that make sense from an economic point of view.