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Measuring Inflation under Hyperinflation: The impact of research on improving the way Peruvian Statistics Office calculates CPI indexes

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Documentation: 1994: Sesgos en la mediciÃ³n de la inflaciÃ³n en contextos
inflacionarios:

el caso Peruano www.grade.org.pe/asp/brw_pub11.asp?id=21

2002: INEI, ActualizaciÃ³n MetodolÃ³gica del Indice de Precios al
Consumidor

en Lima Metropolitana
www.inei.gob.pe/Web/MetodologiasFlotante.asp?file=13.pdf

Until very recently most, if not all, Statistical Agencies in the world relied solely in Laspeyres indexes formulae to construct Consumer Price Indexes. The shortcomings of such a method of aggregation are widely known but its impact is especially evident under high inflation regimes. Inflation data calculated through Laspeyres Indexes can suffer from severe over-estimation because these type of formulae do not account for substitution between different products in response to changes in relative prices.

The over-estimation in the CPI index can have big effects in other key macroeconomic variables such as nominal GDP, since the CPI index tends to be used as part of the implicit price deflator used to move from real GDP to nominal GDP. If nominal GDP and CPI index are over-estimated, a whole range of macroeconomic indicators may be incorrectly measured, profoundly affecting the way macroeconomic policy is conducted. For example, it may be believed that real wages have decreased at a larger rate than they actually did or tax to GDP ratios may look smaller than they really are, fostering a policy reaction that may be unwise.

During the second half of the 1980s Peruvian macroeconomic indicators clearly reflected huge fiscal, monetary and external imbalances. Inflation during this period was very high and almost reached hyperinflation figures by the end of the decade. Between 1992 and 1994 a research team from GRADE studied the Peruvian CPI biases. The results of this research, published in 1994, showed that official CPI had overestimated inflation by more than 50% between 1979 and 1993. To calculate the magnitude of the substitution bias a system of time-variable weights was created from which a Tornqvist-Theil index and a chained Geometric index were constructed. Literature has established that these two indexes are good second-order approximations of the true cost of living index. Due to the fact that knowledge was only gained of the consumption weights for 1979, 1988, 1989 and 1990, these indexes were constructed assuming a linear interpolation between observed weights. The substitution bias, measured as the difference between the inflation obtained from the Tornqvist-Theil index and that obtained from the official index was estimated at 52.4%. When the inflation statistics from the chained Geometric index and the Tornqvist-Theil index were compared little difference was found, suggesting that a simple aggregation scheme based on Geometric index formulae was possible to properly account for the substitution bias.

The research did not stop at measuring substitution bias but also discussed other possible biases in the official inflation gauge. Using a conceptual framework based in the cost of living index theory it was asserted that the main biases of Peru's official CPI index were: a) elementary aggregation bias; b) substitution bias; c) new product bias; and, d) outlet substitution bias. Although each of these biases was important, high inflation environment tended to affect the first two sources of bias more. This was because relative prices between varieties of the same product and relative prices between different products tended to change very rapidly in high inflation environments.

In the case of the elementary aggregation bias, the study showed that the arithmetic average price change formulae used to construct elementary indexes (first level of aggregation) also introduced an important bias. In addition to measuring known biases, the CPI evaluation conducted by GRADE's researchers included an assessment of the way the Laspeyres Index was constructed and the quality of the price data used. It was found that the Peruvian Statistical Agency (INE at the time, now INEI) used a chained version of the Index formulae, which compound the overall bias. Moreover, using price information from an independent source, it was found that during at least two months in 1988 the price data of several education goods was grossly overestimated. Due to the way elementary indexes were constructed and the chained nature of the Index formulae an ever-increasing bias mechanism was inadvertently introduced in the construction of the official inflation gauge.

Despite the solid evidence that was put forward, the Peruvian Statistical Agency disregarded the advice and publicly criticized the research contribution carried out by GRADE. The Statistical Agency stated that it was only the Laspeyres Index that had worldwide recognition between Statistical Agencies, disregarding the research output that Statistical Agencies such as Statistics Canada or the United States' Bureau of Labor Statistics had put forward. The press even quoted the head of INE mentioning that he was 'fed up' with GRADE´s remarks.

It was not until very recently, eight years after this research was published, that the Peruvian Statistical Agency introduced methodological changes to the Peruvian CPI index. In 2001, a few months after the newly elected Government of President Toledo took office, the Peruvian Statistical Agency called upon GRADE's researchers to carry out an independent audit of the way the official CPI index was constructed. Having access to the original database allowed simulation of the effects of different aggregation methodologies and recalculate inflation indexes. The report, which reiterated most of the original findings, was able to assess more clearly the elementary index bias.

The conclusion of the audit report called for an immediate change of the elementary index formulae and presented a timetable to evaluate and introduce further improvements to the official CPI index. The report stated that these changes should be conducted in a more transparent way, by installing a permanent review panel and by publishing the proposed modifications in advance so the public and experts could know the effects of the proposed methodological changes before they were introduced into the official CPI index.

In February 2002, the Peruvian Statistical Office (INEI) introduced the proposed changes to the CPI index and published a new methodological manual showing what had changed and why. Currently INEI is considering the creation of an external review panel which will advise during the process of introducing further revisions to the current methodology.

The final success of this research project can be measured by the increased awareness of the Peruvian Statistical Office about the need to audit its methodological procedures, open them to public scrutiny and introduce timely modifications to ensure that main economic indicators were measured properly. One of the key lessons that this project teaches and that can be a contribution to the debate about the link between policy and research is that research results may take a long time to permeate through public bureaucracies. The effort to synthesise and disseminate the results obtained in 1994 to a larger audience paved the way for the success of the project eight years later, when new appointed public officials were fully aware that something should be done about these issues.

However for this to happen, the correct political environment is needed with suitable people in charge. After more than a decade of authoritarian formal democracy President Fujimori was ousted in 2000, following political and corruption scandals. Peru's transition government, led by interim president Valentin Paniagua, made significant steps towards the restoration of democracy, including removing restrictions on the freedom of the press, the replacement of the dismissed magistrates to the Constitutional Tribunal and open all public offices to public scrutiny. The latter included the construction of a website (Portal de Transparencia) looking for improved ways of increasing the control, efficiency, accountability and transparency of government actions.

After the transition government took office, key public officials loyal to ousted President Fujimori were removed from their posts. Amongst these changes, the head of the INEI was replaced and a former INEI public official working as coordinator for the MECOVI Program was brought in as the new Head of the Peruvian Statistical Office. The MECOVI Program is an Inter American Development Bank/World Bank/Economic Commission for Latin America and the Caribbean initiative, aimed at the improvement of the quality of household surveys on living conditions in Latin America, the establishment of mechanisms to facilitate interaction between data producers and users, and the development of institutional capacity in the counterpart organizations in order to make the activities sustainable. The background and experience of this high ranking official was key to the start of a process of opening to scrutiny all the methodological procedures that the INEI was running.

INEI had a window of opportunity to improve their accountability procedures as the transition government would only stay in power for less than a year and the public establishment was not interested in limiting the public access of this information. It seemed that the head of the Statistical Office thought that once these procedures were introduced it would become difficult for the next government to close the doors in terms of broad public access to data and methodologies. On October 2002, 15 months after President Alejandro Toledo came into office, the head of INEI was again replaced, however all of the procedures developed by their predecessor continue to be in place.