

Nueva estimacion del costo de la vida. Buenos Aires, 1910-1923.

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A NEW ESTIMATE OF THE COST OF LIVING. BUENOS AIRES, 1910-1923

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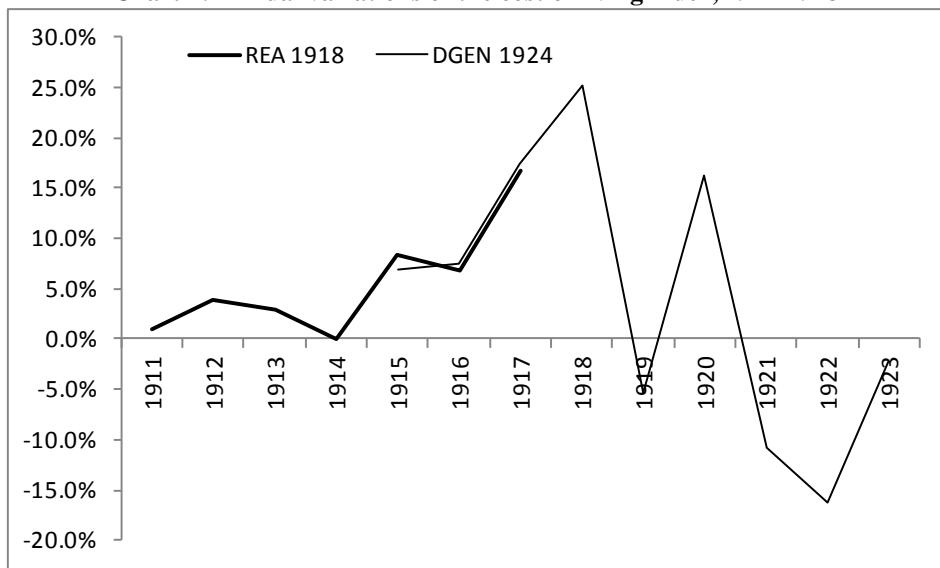
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Estimating a national cost of living index (CLI) became a widespread practice in the early twentieth century. Price series can be used to regulate wages, to set the minimum base for income taxes, to make international comparisons. Two publications are often referenced in the literature on Argentina when talking about the cost of living in the 1910s and the 1920s. The first one was published in 1918 by the Review of Argentine Economics (*Revista de Economía Argentina*, REA). It illustrated a CLI series between 1910 and 1917. The first official pamphlet was released in 1924 by the General Board of Statistics (*Dirección General de Estadística de la Nación*, DGEN), one of the main offices of the statistical apparatus at that time. It extended the previous series until 1923. Both were written by Alejandro E. Bunge, director of the REA and head of the DGEN. By reading and analysing those two very similar publications it would be difficult to fully understand the characteristics of the CLI. Given that they are produced by the same individual, continuity between the series could be expected. Nonetheless, as chart 1 shows, differences in the fluctuations exist for the overlapping years.

Chart 1: Annual variations of the cost of living index, 1911-1923



Source: my elaboration based on Bunge (1918) and DGEN (1924)

A comprehensive analysis of the two articles is needed to set the record straight and fully understand the methodology behind the CLI of the 1910s and 1920s as well as the discrepancy shown in chart 1. Given these and other disparities that arose in the analysis, a consistent series can be elaborated for the years 1910 to 1923. This paper, among many others (Daniel, 2009; González Bollo, 2007), sheds light onto the Argentine's social and labour statistics produced in the first half of the twentieth century. However, there is a gap to be fully filled, especially in the analysis of the

methodology used to develop indicators. In that regard, this paper complements others (Lanata Briones, 2012a, 2012b). All of them aim at opening the door to settle the aforementioned gap.

This paper is structured as follows. The first section reviews the 1918 CLI publication, while the second one analyses the 1924 one. Some doubts that arise from the two articles are settled in the examination of the REA publications of 1919 and 1920, commented on section three. The fourth section shows a new and more accurate estimate of the CLI for the years 1910 to 1923. The last section concludes.

The 1918 REA publication

In July 1918, the REA was launched. The fourth article of the first issue was Bunge's own piece on the CLI between 1910 and 1917. Back then he was also the director of the DGEN. Previously he was the head of the Statistics Division (*División de Estadística, DE*) of the National Labour Department (*Departamento Nacional de Trabajo, DNT*), Argentina's main producer of socio-labour statistics. At that time, Bunge was fully embedded in the Argentine statistical apparatus (González Bollo, 2012). Thus, even though the first Argentine CLI was not published by a public entity, it was based on the information and the knowledge produced by the statistical apparatus. In spirit, the CLI produced in 1918 was an indicator elaborated by the public sector. Bunge started his article synthetically reviewing the international trends of wages and of the cost of living until 1910 to then comment on the Argentine situation. He highlighted that despite the availability of information, by 1918 there was a lack of research regarding the trends of wages and prices throughout the XIX century and until 1910. He claimed that what then interested the country were the recent fluctuations of those two variables (Bunge, 1918: 41). Thus, the CLI developed by Bunge and published in the REA was the first Argentine CLI. This section will analyse the CLI methodology of the 1918 article.

The elaboration of the CLI started with the analysis of the expenditure structure. The information regarding the distribution of resources came from the research carried out in 1913 and 1914 by the DNT, published under the name of Yearbook of Labour Statistics (*Anuario Estadístico del Trabajo*). According to Bunge the annual average wage of workers of the city of Buenos Aires was m\$n1,814.5,¹ a figure based on a

¹ m\$ refers to the currency in place at that time, the *peso moneda nacional*.

sample size of 377 families from different neighbourhoods (Bunge, 1918: 43). Looking at the Yearbooks it can be established that Bunge obtained the figure using a weighted average of the data for 1913 and 1914.² In terms of the distribution of resources, Bunge claimed that 42% of that wage went to purchase food, 19% to pay rent, 31% was used on other expenditure, and 8% in savings. When replicating the weighted average method to the original information, the percentages are slightly different from Bunge's results. Food would represent 43.8%, rent 18.7%, other goods 30.3%, and savings 7.2%. Rounding up, only the rent share will correspond to Bunge's numbers. The food share would be two percentage points (pp) higher, the only section with more than one pp difference.

Bunge continued his methodological explanation stating that one can omit the savings component and re-distribute its share among the other three due to the recent increase in prices relative to wages (*Ibid.*, 43). He did not specify the sources of information he used to re-arrange the percentages. He simply determined that food will account for 50%, rent for 20%, and clothing, lighting and other expenditure (from here onwards 'other expenditure') for the remaining 30%. Bunge aimed to validate these results showing, on a footnote, the budget composition used for elaborating the CLI in the United States (US) and in Germany. He highlighted in bold the piece of data that the reader should consider similar to the Argentine numbers. Nevertheless, when comparing the information referenced by Bunge and the Yearbook data it can be seen that there is a mixture of information that undermines Bunge's comparison. The North American and German data in bold did not refer to the budget structure of the average of all the cases surveyed while the DNT data did. The international highlighted data showed the consumption structure of families earning a specific sum. It could be expected that the wage band chosen by Bunge related to the one that gathered the most cases surveyed. This is the case for the US, but it is an inference regarding Germany. The information presented by Bunge for both of these cases has an average of the budget structure of all the families surveyed, but the reader can assume that he did not compare his results to those averages, as they are not in bold. In the Yearbooks, the data categorised by wage bands did not exist. It was classified by family structure. As chart 2 shows, there are slight discrepancies between the highlighted data by Bunge and each country's average, as well as between these averages and Bunge's final numbers. These discrepancies

² In 1913, 221 families were surveyed while in 1914 that number declined to 156 (DNT, 1915; 1916).

undermine Bunge's legitimisation technique in terms of rounding up the budget structure.

Chart 2: Expenditure shares, in percentage

	Food	Rent	Other expenditure
US data highlighted by Bunge	46.2	18.4	35.4
US data, average of all cases	43.1	18.1	38.8
German data highlighted by Bunge	51.0	18.0	31.0
German data, average of all cases	45.5	18.0	36.5
Bunge's structure for Argentina	50.0	20.0	30.0

Source: my elaboration based on Bunge (1918). Other expenditure for US data is the sum of the items heating, lighting, clothing and other. Other expenditure for German data comprises heating and lighting, clothing and other.

Moreover, the discrepancies presented in chart 2 also weakened Bunge's argument regarding the generalisation of his budget structure, determined with information provided by workers of the city of Buenos Aires, for Argentina as a whole. After he claimed similarities between his consumption configuration and that of other countries, Bunge stated that 'considering the equivalence seen *everywhere* in the distribution of expenditure when grouped it in those three categories, we can adopt such structure for the country as a whole' (*Ibid.*, 43, my translation, my italics). Using the data from Germany and the US, Bunge tried to justify that those preferences can be the same throughout the whole country. Given the lack of equivalence that can be seen in chart 2, Bunge did not show consistent arguments for that to be the case.

Once the structure of the CLI was established, Bunge proceeded to explain the methodology used to estimate each component or sub-index. Bunge did not use the term sub-index. He always mentioned the term index for any series he estimated. The term sub-index will be employed here when considering the estimates produced for the three categories of the CLI: food, rent and other expenditure. How these sub-indices were developed will now be analysed.

The food sub-index

Bunge began explaining how he estimated the food section of the CLI asserting that in Argentina 'the two main consumption articles are meat and bread; each of them absorbs 30% of the value invested in food' (*Ibid.*, 45, my translation). All other food items weighted 40%. Given the Argentines' consumption patterns, the author stated that the food sub-index will be the weighted average of the three sections mentioned: meat, bread, and other food items. He did not provide any evidence of or references for the predominance of bread and meat in the Argentines' diet. In the DNT Yearbooks, the

sources for Bunge's consumption structure, it can be seen that there was information as aggregate as the four categories mentioned (food, rent, savings and other expenditure), and no further break down. Clearly, the Yearbooks were not his source in this regard.

Starting with the meat item, Bunge stated that in Argentina at that time 80% of the meat consumed was beef, followed by lamb (15%) and pork (5%). As with the food sub-index, he did not reference any source for this information on preferences. Bunge produced a price index for each of the three meat items, not indicating where the price information came from or what type of price it was. Each price index was estimated using the formula:

$$\text{Price index}_t = 100 * \frac{P_t}{P_{\text{base year}}}$$

Bunge used the above shares to estimate the meat indicator as a weighted average. Given his need to be extremely explicit on how he estimated the CLI as a whole, he showed each yearly calculation.

Bunge elaborated the bread indicator using the price of second class bread, as that it was the one that mainly consumed by workers (*Ibid.*, 47). This was the first indication in the article to the type of price used. Still there was no reference regarding the source of the price information. He used the same formula as stated above to estimate the indicator of the price of bread.

He designed the indicator for other food items considering fourteen goods: oil, rice, sugar, milk, charcoal, firewood, coffee, tea, yerba, flour, fat, potatoes, wine and tobacco.³ All Bunge did was elaborate price indices for each good using the same formula as for the bread and the different types of meat. In a footnote he claimed that the prices used are those of the public statistical apparatus (*Ibid.*, 50). The other food items category was estimated yearly as simple average. This method gave the same weight to all items, undermining the representativeness of the CLI. As mentioned before, the DNT Yearbooks did not gather information on consumption apart from the four main categories.

³ He stated that the number of goods of this indicator should be increased considering items like fish, fruit, cheese, etc (Bunge, 1918: 48). Firewood, charcoal and tobacco are not food items, and they could be a part of the other expenditure.

Finally, to estimate the food sub-index, Bunge carried out a weighted average of the three food indicators-meat, bread and other food items-using the percentages mentioned: 30%, 30% and 40% respectively. As he did for the meat index, he showed the yearly calculations.

The rent and other expenditure sub-indices

Given the relatively less information on the procedures Bunge used to estimate the rent and the other goods sub-indices, they will be explained in the same section. For the former, Bunge explained that the trend in rent prices between 1910 and 1917 was registered by the DNT (*Ibid.*, 52). He did not specify what that rent estimate referred to or how it was estimated. It cannot be discerned if the price reflected the rent of a room, a flat, etc. and what characteristics did that housing had. When Bunge provided estimates of the general cost of all the expenditures of the Argentine, he considered again the cost of rent. Bunge argued that he had estimated the 1914 value of all rents and leases in the country. That value then fluctuated according to 'the ups or downs relative to that year, given that the harvested area has not increased much in those years and that building activity has been more or less paralysed.' He also further specified that the DNT had estimates for 1912 to 1915 and that the remaining years were estimated by him (*Ibid.*, 60-1, my translation). The sub-index series presented in the general cost section was the same as the one presented in the CLI section. One can infer that the movement of this sub-index referred to all types of rents and leases while the share in the CLI was obtained from the consumption preferences of a sample of workers of the city of Buenos Aires, showing an inconsistency between the two pieces of information.

As for the clothing, lighting and other expenditure sub-index, referred here as other expenditure, Bunge stated that 'the variations in the price of the wool, cotton and other textile items (excluding silk), tools, appliances, kerosene and other goods that are grouped in this category are regulated by the fluctuations in the prices of imported goods that, on top of representing a large share of total consumption, result in corresponding oscillations in the internal market' (*Ibid.*, 53, my translation). The source of this data were the national statistics, more specifically *Intercambio económico de la República* (DGEN, 1918). In a long footnote, Bunge mentioned the need to clarify the procedure behind the estimate of the index numbers of the prices of external trade. Given that at the time Bunge was head of the DGEN, he had clear knowledge of such procedure. He explained the methodological process used to estimate both the export

and import number indices. This could be somewhat misleading, rendering the interpretation that both imports and exports were used to estimate the other expenditure sub-index, contradicting his previous statement. Exports are not consumed internally, so they should not be considered when estimating a domestic CLI. Despite this slight confusion, it can be assumed that the inclusion of the export methodology was only for clarification and that Bunge only used imports.

When explaining how the import index number was constructed Bunge stated that the index number was estimated with the corresponding imported value, meaning that quantities changed every year. Moreover, he mentioned that annually 21 index numbers were constructed with the corresponding groups of articles and several isolated goods like charcoal,⁴ sackcloth, etc (Bunge, 1918: 54). There was no specification of what were the 21 index numbers used, making it difficult to reconstruct and verify that index. In the DGEN publication one can see that for 1917 considering groups of articles and isolated goods one could obtain 41 indices. Moreover, there was an implicit assumption that the same 21 index numbers can be constructed each year and that the country consistently imported all those products. A comparison of the disaggregated data showed that in the list of the isolated articles considered in 1917 there was sackcloth. Nevertheless that item did not appear in the 1910 list (DGEN, 1918: 198, 273), so it can be assumed it was not imported and that the index number did not consider always the same items, which contradicts Bunge's statement.

Using an index that solely reflects the behaviour of imports, not adjusted by what might happen locally, implies that all that is imported is consumed. Furthermore the quantities of the other expenditure sub-index change every year while the quantities of the other sub-indices stay fixed. Assuming that there can be domestic production of some of these goods that can increase the total quantity consumed as well as the overall value, only considering a foreign trade index ruled out that possibility. Thus, the other expenditure sub-index used might not have reflected actual consumption. Regarding the goods consider in this sub-index, did the workers-the individuals whose consumption was supposed to be reflected in this CLI-easily access imports? Several questions arise and remain unanswered when analysing the rent and the other expenditure sub-indices.

⁴ This item was already considered in the food sub-index.

The cost of living index... and its pitfalls

Once Bunge explained how he estimated the three sub-indices, the calculation of the CLI was straightforward. It corresponded to a weighted average of the three components using the shares commented above: 50% for food, 20% for rent and 30% for other expenditure. Once again, he showed how he obtained each index number. In the title that preceded those calculations, there was a footnote that stated that if one wished to estimate the cost of living for a higher budget-meaning a budget with higher purchasing power-, it was down to changing the 50-20-30 percentages (*Ibid.*, 55). This assertion implied that no matter the purchasing capacity all families consumed 80% beef, 15% lamb and 5% pork out of all the meat consumed. Moreover, it meant claiming that within the food sub-index, whatever the purchasing capacity all Argentines spent 30% on meat, 30% on bread and 40% on the rest of the food items. This cannot be true. The discrepancies in consumption among individuals/families with different incomes cannot be shifted only by changing the 50-20-30 percentages as Bunge suggested. Nevertheless, such technique has certain validity given the way the author has estimated the CLI, where consumption patterns are not really specified given the lack of information.

Previously, some methodological problems were highlighted when assessing the 1918 CLI. More general issues will be considered now. Bunge never clearly mentioned the sources of the price data of the meat and bread indicators. He did not fully specify what type of prices (retail, wholesale) he used in the food sub-index. As for the first issue, for the other food items indicator he mentioned that the prices corresponded to those gathered by national statistics. It can be assumed that Bunge referred to the publications of the DGEN. When looking at *Intercambio económico de la República*, it can be seen that all the prices quoted there correspond to the ones used by Bunge in the estimation of the food sub-index.

Regarding the types of prices used in the food sub-index, it is very hard to grasp just by reading the article, if the prices used were wholesale or retail. It would be expected that a CLI would be estimated with the latter. In the article, the type of prices used in the elaboration of the meat indicator was not mentioned. When analysing the bread one, Bunge stated that the price referred to second class bread. This still does not specify if it is a wholesale or a retail price. It was with the elaboration of the other food items indicator that the matter was (not) treated. Bunge stated that 'when trying to study

the "fluctuations" of the overall cost of food, it is enough to know the ones relating to the wholesale price of bread, meat and the other items, given the correlation that exists between those fluctuations, when analysing them annually, and that of retail prices as well as the "prices the workers pay". This did not settle the matter, as he then declared that 'to study the causes of high food prices in our country, *as we intend to do, (...)*' three prices should be considered: wholesale, retail prices, and the "prices the workers pay" (*Ibid.*, 48, my translation, my italics). He quoted the 1914 DNT Yearbook to say that evidence showed that those three different types of prices existed and that they were substantially different from each other: the poorer the buyer, the higher the price paid. Quantitative evidence of this was shown in the 1914 Yearbook (DNT, 1916: 224-7). Nonetheless, Bunge's clarifications regarding prices were somewhat confusing. At the beginning, it seemed that using either wholesale, retail or the "prices the workers pay" can be indistinct, especially when estimates are annual. Nevertheless, the phrase 'as we intend to' in the sentence immediately after shifted the focus to the need to consider different types of prices. The topic is not settled as he did not state what prices he used. Later in that same footnote he considered the matter saying that there was no other country in the world where the distribution chain was so costly, making the difference between production and consumption prices so big (Bunge, 1918: 48-9).

The prices used in the estimate of the CLI came from the DGEN, more specifically, from *Intercambio económico de la República*. There were no specifications regarding the prices methodology in that booklet, just price tables with monthly and annual data between 1910 and 1917 for all the goods of the food sub-index. The annual series corresponded to the simple average of the monthly data. When the tables started, there was a clarification in parenthesis after the title stressing that prices were wholesale (DGEN, 1918: 158). Despite that, when presenting the price of milk the word retail is in parenthesis. Given the way it is specified, it cannot be inferred that all the subsequent prices were also retail. The question that arises is why only the price of milk was a retail price; also, was there a printing mistake and all the subsequent prices are retail ones as well?

These comments show confusing evidence regarding the type of prices used. What will be understood here is that following the clarifications of *Intercambio económico de la República* the prices of the food sub-index were wholesale. This undermined the methodology of the CLI. Moreover, Bunge's emphasis on the

discrepancy between different types of prices summed up to his intention to estimate a CLI based on the preferences of the working class also casts doubts on the methodology used.

The two DNT Yearbooks were amongst the main sources of information for Bunge. As mentioned, they were published when Bunge was head of the DE of the DNT, so he knew their content well as how it was gathered. The Yearbooks compiled a lot of information regarding socio-labour statistics. Some issues should be pointed out regarding the distribution of resources data. It was collected in order to initiate the estimation of a CLI of the working class starting ideally in 1900 (DNT, 1916: 227). There was no specification on how the information was collected, what sampling technique was used, or when and how survey was carried out. There was no information regarding methodology. The Yearbooks published the questionnaire handed out to the families, who were asked how much money they spent on different goods and services per month and per year. The pre-determined categories were: food; clothing; rent; fuel; lighting; taxes; life insurance; furniture and utensils; books and newspapers; private schools; transport; language, music, painting teachers or institutions; religious cult; charity; worker unions; amusement; health; wine and liquor; tobacco; other expenditure. At the end it asked the interviewees to estimate if that year there was a surplus or a deficit in their expenditure, asking how they covered the deficit or what they did with the surplus. There was no breakdown regarding the food items consumed. As inferred earlier, this was not the source of information Bunge used to determine the different types of meat eaten or the share of meat, bread and other food items on total food. Given the number of categories, the DNT could have distinguished fuels and taken out charcoal and firewood from the food sub-index. The same occurred with tobacco. Wine could have been a separate category in the food sub-index instead of being part of the other food items category. Lighting could compose a separate sub-index and not be included together with clothing and other goods. Given the questionnaire format, more detailed information could have been provided by the DNT. Expenditure was only divided in the four categories mentioned: food, rent, savings and other expenditure. No indication of how and why these categories were determined existed in the Yearbooks. The lack of detail data means that what was gathered was not reliable at that level of disaggregation.

The 1918 REA article was the first CLI publication, with an index between 1910 and 1917. Though very precise and methodologically detailed, it rendered several doubts. Most will be settled in the following sections.

The DGEN publication. Differences or similarities with the REA index?

The first official publication of the cost of living was released in 1924, though as shown it was not the first cost of living analysis with official data. It was published by the DGEN, when Bunge was its director. This explained the continuity and the similarities between it and the 1918 article, as well as the public spirit of the latter. As it happened with the REA piece, Bunge was the author. The CLI series was estimated for the years 1914 to 1923. The base of the index was 1914. The interest in the DGEN publication relies in what can explain the differences in the variations of both indicators (see chart 1) as well as in the clarifications that existed in the 1924 publication relative to the 1918 one. The latter issues will be addressed in this section.

Bunge began his explanation of the estimate of the CLI stating that the prices used were from the city of Buenos Aires. The annual value was the average of the monthly prices. He also claimed that there was a correlation between the fluctuation of those prices and the variations from the rest of the country, though absolute prices differed. That movement meant that the value of the CLI could reflect trends of the country as a whole. He later asserted that if the worker received part of his payment in kind, that would represent a proportionate sum to the one he would get in cash (DGEN, 1924: 10). Nonetheless, it cannot be a valid reason for the extension of the CLI to the whole country. Bunge stated that 'the differences in the cost of living among the Republic's regions are usually important. That is why we don't extend the absolute numbers from Capital to the rest of the country. However, in the price fluctuations we can see an almost constant correlation throughout the whole Republic, with the exception of some prices that do not influence the aggregate' (*Ibid.*, 11, my translation). This should not be interpreted as a contradiction with his previous statement of the generalisation of the CLI to Argentina as a whole. Even if the initial absolute value of the basket differed throughout the country, the variations were the same. When using index numbers, the initial absolute value is not significant, what matters are the variations that according to Bunge were similar all over the country. Although without concrete evidence, Bunge provided a different explanation regarding the representativeness of the CLI to the 1918 one.

Similar to the REA article, Bunge started the description on how he estimated the CLI explaining the food sub-index. In this case, he clarified that he used wholesale prices to estimate the meat indicator. The relationship between wholesale and retail prices was almost constant (*Ibid.*, 12), so for Bunge it did not matter the type of prices used.

A significant discrepancy between the 1918 and the 1924 existed in the other food items category. In the latter estimate, Bunge considered 18 instead of 14 goods, adding cheese, eggs, fish and butter. The procedure to estimate the other food items category was the same one, where all items have the same weight.

Bunge spent less time explaining the sub-index other expenditure, compared to the 1918 article. The paragraph that referred to it was exactly the same in both publications, but in 1924 without the long footnote. The lack of mention to exports meant that such variable was not considered when estimating this sub-index. This settles the doubt generated by the 1918 article.

Lastly, when constructing the CLI, one can see that Bunge used the same proportions as in the 1918 article for the three sub-indices for the estimates between 1914 and 1918, but he changed the weightings between 1919 and 1923. For the latter years, food represented 50%, rent 26% and other expenditure 24%. He did not explain why the need for such change nor how he merged the two different sets of estimates together. Looking at the final numbers published, it can be seen that Bunge presented the 1919 to 1923 values as a continuation of the 1914-1918 estimates without using a proper combination method of index number estimates. What is to be highlighted here is not the modification of the shares *per se*, but the incorrect procedure that followed such alteration, which casts doubts on the value of the final estimates.

With this new information, the apparent differences between the two indices plotted in chart 1 possibly related to the number of goods considered in the other food items category. Despite other clarifications, some doubts still exists. For example, what type of prices were used, as it was only fully clarified for the meat indicator. A new query can be added, which relating to the reason behind the change in the weightings of the three sub-indices. These uncertainties are dealt with in the following section.

The other publications: updating the cost of living series

The previous sections reviewed the two most cited publications from the 1910s and 1920s that analysed the Argentine CLI. Between 1918 and 1924, the REA printed two articles that updated the 1918 numbers. It will be shown here that these two publications helped in the clarification of some of the issues that previously appeared. Some of the queries that arose in 1918 were dealt with before the 1924 publication.

The 1919 update

In 1919, arguing the need to update the CLI, Bunge published another article deeply engaged in methodological issues. He introduced the explanation for the representativeness of the shares of sub-indices of the CLI for Argentina as a whole that was used in the 1924 publication. He also incorporated the change in the shares of the sub-indices. The main difference relative to the 1924 article is that Bunge provided a justification for that change. He showed that in 1918 there was an increase on rent prices of around 30%, with no subsequent rise in wages. The author stressed that at that time, workers could not reduce their living space as they generally lived in one room. Thus, Bunge inferred a change in the consumption pattern that reduced the share of the sub-index other expenditure to 24%. The rent sub-index represented 26% and the food one remained unaltered (Bunge, 1919: 321). Given the rise in rent prices and due to the housing situation of workers and their families, the changes in the shares have a *raison d'être*. Nevertheless, other problems highlighted for the 1924 still exists: what exact information did Bunge use to change the percentages in that magnitude? How did he match the series? When he showed the calculations to estimate the CLI, the 1918 value was presented as a continuation of the 1910-1917 estimates without using a proper combination method of different index estimates, just as he did in 1924. In the latter publication, the change in shares started in 1919.

The 1920 publication

The 1920 article is the first one not written by Bunge. The footnote to the title of the piece holds relevant information. It explained that Juan Carlos Valle and Ludovico Ferrari, students of the Economics School of the University of Buenos Aires and authors of the piece, were in charge of updating the CLI for 1919. The footnote also stated that others students of the same institution carried out research to estimate the CLI of different provinces. That research confirmed that the fluctuations of the cost of living in the city of Buenos Aires 'represent very closely those of the country as a whole' (Valle

and Ferrari, 1920: 254, my translation). No comparisons were presented nor were found in other volumes of the REA.

The 1920 article opened with some information one would like to find so neatly stated in the 1918 one: 'the results of the estimates carried out until today, considering the fluctuations of wholesale prices ...' (*Ibid.*, 254). This fully confirms the previous assumptions regarding the types of prices used.

When analysing the food sub-index, the authors specified that in the other food category they considered two items-charcoal and firewood-that are not food but are used for cooking purposes (*Ibid.*, 256), as pointed out earlier on in this paper.

As it has been shown, the 1919 and the 1920 articles published in the REA helped to shed light onto some of the issues raised when exploring the 1918 and 1924 CLI papers. Still, the quantitative discrepancies of the two indices have not been analysed. Such differences will be addressed in the following section.

A suggested improvement of the CLI

The annual variation differences crystallised in chart 1, the simplicity of the method used by Bunge and the complete availability of certain data allowed a thorough examination of the CLI estimates. The main objective of this section is to show the results of a new CLI series between 1910 and 1923. This aim relates to existence of the different shares of the three sub-indices of the CLI as well as the different number of goods used in the other food indicator in the 1924 publication.

Solely considering the information on the 1918 and on the 1924 publications, Bunge's estimates can be revised in order to develop a more consistent CLI for the period 1910-1923. As for the issue of when to change the shares of the sub-indices, due to the differences in the DGEN article and that of the REA of 1919, the year suggested in the DGEN, 1919, will be considered. Two reasons are behind this choice. If prices rise, the adjustment in behaviour might not be immediate. So if rent prices rose in 1918, the adjustment will be in full force in 1919. Also looking ahead, the 1928 REA article still kept the change in 1919.

There is no disaggregated information to re-estimate the rent and other expenditure sub-indices. The data used to re-construct these two sub-indices corresponded exactly to what the two articles published. The main re-estimation was

performed for the food sub-index as price data for all the goods was published both years. Therefore, discrepancies between the new estimate and the simple combination of the Bunge CLI can only come from this sub-index.

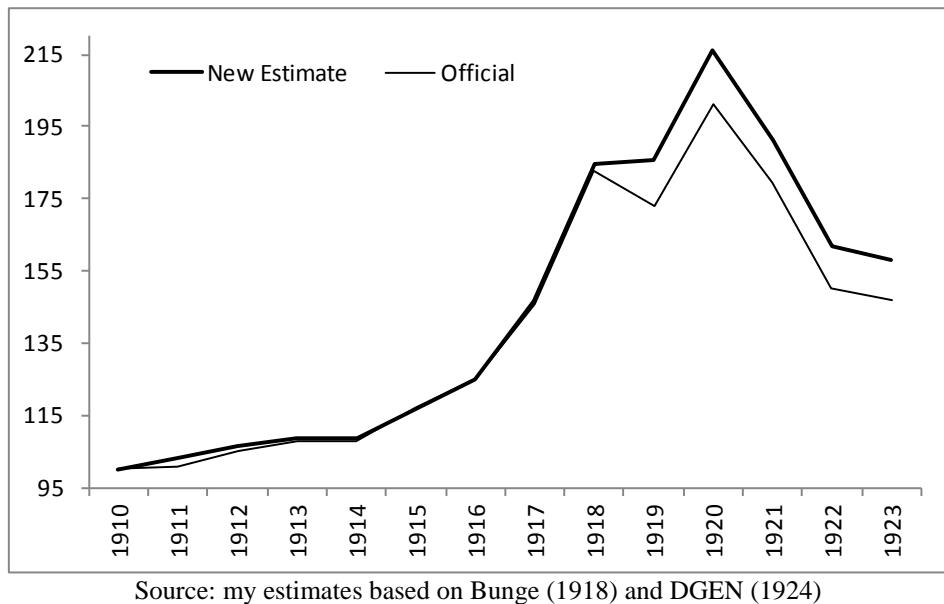
Before presenting the final results, it is important to explain some issues. For the years 1910 to 1917, all the data used came from the 1918 article. The sub-indices percentages used were 50-20-30 for the food, rent and other expenditure, respectively. The other food items indicator considered 14 goods. Nevertheless, the final numbers of the food sub-index are not the same as the ones published in 1918. Some are subtle rounding differences, which do not influence the final estimate, but others are more relevant discrepancies. Two of the latter were spotted for the beginning of the series. As mentioned, Bunge showed all the calculations used to estimate the corresponding sub-indices and the CLI. Therefore, if there were any calculation mistakes or typos, they are easier to come across. In the 1911 estimate of the food sub-index, it can be spotted that Bunge considered the wrong meat indicator number. Instead of using the correct number, which was 98 for Bunge's calculations as well as in the new estimate, he computed the sub-index using the number 85. This rendered a food sub-index 2% lower in 1911 relative to 1910, when the number should have been 2% higher. In 1912 there was a typo mistake when estimating the meat indicator. The beef number used to estimate the meat indicator should have been 111, as Bunge's numbers and the new estimate showed. Nevertheless, in the calculation of the meat indicator, Bunge computed the number 100. As a result, the meat indicator in Bunge's publication was 102 when it should have reached 111. Given these two issues, the new estimate showed higher inflation in 1911 and in 1912 compared to the Bunge one. The 1918 figure was calculated applying the year-on-year variation to the 1917 value of the 1910 to 1917 series. The 1917 and 1918 figures used to estimate such variation have the 50-20-30 shares of the three sub-indices as well as 14 goods in the other food items category. This was done to keep consistency with the 1910-1917 numbers. Lastly, for the years 1919 to 1923, numbers were calculated applying a year-on-year variation to the 1918 figure considered above. Following the DGEN procedure, the 1918 to 1923 series initially estimated have the alternative percentages of the sub-indices proportions (50-26-24). They also considered 18 goods in the other food items category.

Chart 3 shows the new series as well as an estimate that combines the 1918 and the 1924 data in the same way as the new one, but with no alteration of Bunge's CLI

numbers. Given that only Bunge's final numbers are used, the 1918 figure corresponds to the 50-20-30 share but considers 18 items in the other food indicator.

Chart 3: Different estimates of cost of living index, 1910-1923

Base 1910=100



Source: my estimates based on Bunge (1918) and DGEN (1924)

Between 1910 and 1923 the official increase in the cost of living of workers of the city of Buenos Aires was 47.1%, while for the new estimate it reached 58.2%. The latter shows an increase of the cost of living 11.1 pp higher than the official one. What rendered this discrepancy? On the one hand, there was the smaller rise of the cost of living in the official data in 1911 and 1912, which related to the issues mentioned earlier regarding typos in the 1918 publication. But the major discrepancies that started in the late 1910s, are what explain the 11.1 pp gap. In 1918 it related to the differences in the amount of goods in the other food items category. Nevertheless, the divergence accentuated in 1919. In that year Bunge changed the shares of the sub-indices, lowering the other expenditure proportion from 30% to 24% and increasing the rent share from 20% to 26%. Bunge did not use an appropriate procedure to merge the two sets of estimates in the 1924 publication. He simply estimated the 1914 to 1918 with one group of proportions and 1919 to 1923 with the other and published one series after the other. Thus, the two groups of estimates are not related with each other in any way. The combination used in this article is an improved way of merging the two sets of estimates. It smoothes the change, rendering a more accurate picture of what happened with the cost of living in the late 1910s. The variations from 1920 onwards are quite similar in the two series, reason why the two moved in parallel and the gap did not close. The official underestimation would have an impact on other estimates, such as the

material standard of living of workers, measured through the real wage. A higher CLI would show that workers could afford less goods and services. Given their wages, this would have made them poorer thus showing a more deteriorated material standard of living. This is currently under research.

Conclusions

Two publications are commonly referenced when assessing the Argentine's cost of living between 1910 and 1923. One was published by the REA in 1918 while the other was released by the DGEN in 1924. A thorough read of the articles renders methodological uncertainties as well as the quantitative discrepancies in the two series. Both issues were addressed in this paper and a new CLI series was estimated. Also, two other articles published in between the main two were analysed here. The intention was not to doubt the accuracy of the information *per se*. The objective was to highlight the issues with the CLI indices published in order to fully understand it.

Three problematic concerns were identified with the CLI methodology. First, the very aggregate budget structure, due to the lack of detailed information. This led to all goods of the other food item indicator to weight the same on the food sub-index and to the other expenditure sub-index estimated with imports information. Moreover, there was a lack of clarity regarding the prices used and their sources, which for the case of the food sub-index was only dealt with looking at one of the in-between publications. Lastly, the way the two series with the different shares of the sub-indices were merged was dubious. The composition of the CLI should be adjusted, but using a correct methodology. What is to be highlighted here is not the alteration of the shares, but the procedure behind it, and the contradiction in the different publications as to when the change should be implemented. The existence of that lack of proper adjustment led to the discrepancies in the overall increase of the cost of living between the new estimate carried out in this paper and the simple merge of Bunge's numbers shown in chart 3. Looking further into the DNT publications it can be seen that budget surveys of workers of the city of Buenos Aires were carried out practically on a yearly basis between 1913 and 1929. The results showed that between 1919 and 1923 the proportion of the workers' income used to pay rent averaged 17.6% (DNT, 1920; 1927), a substantially smaller share than the one by Bunge in the 1924 CLI estimate. Research is being carried out in order to incorporate this data to the CLI estimate.

Slightly less challenging issues include the extension of a CLI elaborated with information from the city of Buenos Aires to the country as a whole. Even if the fluctuations were the same all over Argentina, what can surely be different are the shares of the sub-indices in the total CLI, which can alter the variations. Bunge based his justification of certain decisions on the fact that the CLI reflected the preferences of the working class. The term working class or worker usually refers to a certain type of individual/family: one that lives in an urban area, whose head of household is employed in manufacturing industry. People living in the countryside, for example, have other means of subsistence. In the 1910s, workers were mainly found in the city of Buenos Aires, which justifies the fact that Bunge's data regarding preferences and prices came from that jurisdiction. This clearly casts doubts on the extension of the results to the country as a whole.

In spirit and although published privately, the 1918 CLI was not only the first Argentine CLI, but it was also an indicator elaborated by the public sector due to Bunge's engagement with the statistical apparatus at that time. Compiling and analysing together the different publications that refer to the CLI of the 1910s and 1920s has allowed us to portray a "history of" that index. It has also helped in filling in the gaps of information and lack of clarification that one can encounter by only reading either the 1918 or the 1924 articles. The effort carried out by Bunge and his team was outstanding and it is not the aim of this paper to undermine it. The transparency in the methodology used should not be disregarded. The objective here was to critically assess and fully understand the methodology used in the elaboration of the CLI.

The publications analysed here tried to set the foundations to analyse the standard of living of the Argentine society, especially the working class. This article proved that the CLI developed by Bunge for the 1910s and early 1920s was an indicator with specific methodological problems. This paper has contributed to the idea that statistics are a form of knowledge and a source of power, but their usage has to be thought out carefully. Public statistics, specifically, are not only developed for the sake of knowledge, but also to design different types of policies as well as to give support to previous policies or the status quo. It is important to consider the context in which statistics are produced and the methodology carried out to gather the information or to develop indicators. Statistics are not the revealed truth; they are an instrument that can help us understand certain phenomena with more accuracy.

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