Informal Employment and Business Cycles. Stylized facts for Argentina, 2004-2024.

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Abstract

The present study explores the dynamics of Argentina's informal labor market from 2004 to 2024, analyzing the stylized facts regarding the business cycle using contemporary information. The results obtained are contextualized by comparing them with studies conducted by local researchers and the main aspects highlighted in the international literature.

Unlike similar studies and in line with current trends that seek to overcome the limitations caused by the lack of availability of statistical data, which poses a challenge inherent to the phenomenon studied, this research is based on a time series package filtered by the authors directly from the microdatabase of the Permanent Household Survey. This survey is openly provided by the National Institute of Statistics and Censuses of Argentina.

The findings challenge the view of informality as a social safety net: although informal jobs rose slightly when formal employment contracted, the effect was modest, lagged, and rarely significant. Informal employment also showed nearly twice the cyclical volatility of formal jobs, with employers and unpaid family workers being the most volatile, and the self-employed closer to formal workers. Marked heterogeneities by category, gender, education, and sector highlight the complexity of the phenomenon and the need for more targeted policies.

JEL classification codes: [E32], [E24], [E26]

Keywords: *business fluctuations, cycles, labor markets, informal economy*

1. Introduction

The relationship between labor market and economic activity has always been a central issue in economics. Today, its relevance remains constant, with the addition of new challenges such as the technological disruption—in particular, advances in artificial intelligence—and cultural changes resulting from the COVID-19 pandemic. Moreover, the academic approach continues to broaden its scope to include more specific and complementary aspects to the traditional economic analysis, reflecting a constant adaptation to an evolving global environment.

In this context, labor market studies in recent decades have focused mainly on the dynamics of registered employment, with a special emphasis on salaried employment. Furthermore, key studies have relatively neglected informal employment and the consideration of other occupational categories. This is partly due to the lack of available statistical information, but also to the limited relevance of labor informality in developed economies.

On the other hand, the reviewed studies on labor informality, both in Argentina and worldwide, show its importance for developing countries. They also highlight that the stylized facts regarding informal employment and business cycle vary significantly across countries. These variations are relevant between developed and developing economies, as well as between countries with similar economic structures but located in different geographical regions and with different cultural frameworks.

This heterogeneity in the case studies generates divergences in the results obtained, making it difficult to formalize a unified theoretical framework. In fact, peculiarities are also observed within the different labor relations characterized. For example, the informality associated with a salaried job in a dependent relationship differs significantly from the informality associated with a self-employed job. Moreover, within each category, some groups of the population are particularly vulnerable in terms of gender, age, and education, to name but a few of the most important dimensions.

All of the aforementioned add greater complexity to designing active long-term labor market policies[1] and addressing temporary issues related to training programs, unemployment funds, work relocation, and—more broadly—the mitigation of temporary negative shocks. These include the effects of the COVID-19 pandemic and the recurrent impact of economic recessions on the level of employment.

Regarding the motivation behind the paper, it is worth mentioning that the authors have prior experience working on related topics. The first investigations arose from the provincial project on business cycles that the Centro de Estudios de la Bolsa de Comercio de Santa Fe (CES-BCSF) has been carrying out since 2007[2] has been carrying out since 2007. The subsequent development of this space and the consolidation of a work team laid the foundations for the formulation of a national indicators program jointly with the Bolsa

[1] Known in the literature as "*Active Labor Market Policies (ALMPs).*" A recent approach that incorporates an analysis of relative impacts can be found in Levy Yeyati, Montané, Sartorio & Gauna (2025).

[2] Access the website at: https://www.bcsf.com.ar/ces/.

de Comercio de Rosario, which led to the creation of the Centro de Investigación del Ciclo Económico (CICEc)[3] of Argentina in 2024.

In line with the problems described above, this paper aims to analyze explicitly the dynamics of the informal labor market in Argentina and its relationship with the business cycle. For this purpose, we internalize the experience of international frontier studies based on information from official surveys with a national scope.

In terms of the main contributions pursued, the emphasis is placed on two issues: (1) to verify the stylized facts for Argentina within the period 2004-2024, which implies including the effect of the COVID-19 pandemic in the analysis, and (2) to identify the characteristics of population subgroups within the informally employed, generating insights that facilitate a better understanding of the most outstanding particular aspects within the prevailing heterogeneity. In this regard, note that no recent studies have been identified that relate labor informality and the Argentine business cycle with data after 2018 or take full advantage of the disaggregation allowed by the filtering of microdata from the Permanent Household Survey (EPH, for its acronym in Spanish) provided by the National Institute of Statistics and Census (INDEC, for its acronym in Spanish) of Argentina.

The rest of the paper is organized as follows. Section 2 presents the conceptual framework and bibliographical background on labor informality, including its relationship with the business cycle and the Argentine case. Section 3 explains the empirical strategy followed and the proposed methodological framework. Section 4 contains descriptive statistics and the analysis exercises carried out with the work results, and Section 5 presents the conclusions. Appendices with complementary and significant information are also included.

2. Framework and related literature

2.1. Informality in the world and the region

Informality is a phenomenon that affects all the economies of the world to varying degrees. Although its scope must be adjusted to each particular context, in this paper we adhere to the definition of informality as circumscribed to all those legal activities that offer market-based goods and services, but are hidden from the authorities for monetary, regulatory, or institutional reasons (The World Bank, 2010).

On the other hand, the concept of labor informality is more limited and, at the same time, *"…has evolved over time to adapt to the continuous changes in the economic structure and labor relations…"* (CEPAL, 2024, p. 179).

The International Conference of Labor Statisticians (ICLS)[4] held in Switzerland in 2023 included within the spectrum of labor informality salaried workers and family workers without employment contracts, as well as self-employed workers who own an economic unit (employers) and independent contractors or self-employed workers not registered with the tax authority.

[3] Access the website at: https://cicec.ar/.

[4] See https://ilostat.ilo.org/es/about/standards/icls/icls-documents/

When understood in this way, informality affects both the accounting and tax registration of an economic activity and the labor market itself, having a negative impact in several key areas. It reduces tax collection and income to the social security system (both pension and health). It also facilitates the evasion of public regulations, such as authorizations, good practices, and suitability permits. Altogether, this undermines the equality of requirements and the competitiveness of companies, whether or not they comply with the regulations. In addition, it generates a state of special vulnerability for those who work regularly and do not pay contributions to the system, thus excluding them from the special benefits offered by the formal labor framework.

Although these issues also affect developed countries, their impact is particularly problematic in emerging markets and developing economies (EMDEs). In these countries, informality is combined with more complex and persistent socioeconomic and institutional circumstances, and is intertwined with poverty, corruption, and social exclusion in a broad sense.

Overall, informality in EMDEs still accounts for about one-third of gross product and about 70% of total employment (The World Bank, 2022). Latin America is also one of the most affected regions, ahead of other regions such as Sub-Saharan Africa and South Asia, where the most unfavorable indicators are observed. Over the last three decades, informality as a percentage of gross domestic product (GDP) in Latin America has declined slightly from 40% to 35%. However, in several countries of the region, levels of labor informality are still very high. It exceeds 60% in Bolivia. In Honduras, Nicaragua, Colombia, and Peru, it ranges from 45% to 60%. In the rest of the countries, including Argentina, the range fluctuates between 30% and 45% (The World Bank, 2022).

2.2. Labor informality and the business cycle

Following an extensive review of the literature, two papers were identified as particularly useful for contextualizing this work. Both have a broad geographical scope that distinguishes between groups of countries with dissimilar economic structures. At the same time, they are current, technically sound, and prepared with institutional backing.

One of them is "*The Long Shadow of Informality: Challenges and Policies*," authored by the World Bank and published in 2022. It brings together evidence for 160 countries over 30 years. Its findings lay the foundation for the main stylized facts on informal employment at the global level.

In developed countries, unregistered employment behaves without cyclical correspondence (acyclical) or accompanies the cycle (procyclical) to a lesser extent in terms of intensity. On the contrary, EMDEs behave in a slightly countercyclical manner. In other words, in many countries in this group, informal employment is indeed countercyclical, but with a lower amplitude than that of registered employment (The World Bank, 2022).

In all cases—whether acyclical, slightly procyclical, or countercyclical—what actually increases during recessions is the proportion of informal employment. This is because registered employment, being

synchronized with the business cycle, tends to deteriorate in downturns. At the same time, if informal employment is less cyclical and relatively stable, its proportion of total employment increases.

The other paper of particular interest focuses on the labor market in some North African countries (Bizimana & Arzoumanian, 2023). The authors complement this work with a prior contextualization and classification by region. This exercise is carried out using information from the International Labor Organization and the International Monetary Fund team's own calculations. The conclusions of the study indicate that the response of labor markets to output fluctuations is more subdued in countries with higher levels of informality, while informal employment is countercyclical and acts as a buffer during economic recessions in countries with relatively higher levels of informality. In this context, it should be clarified that the study classifies Argentina as a country with a medium level of employment informality. The African countries included in the study are classified in the same category, which also includes most of the Latin American countries. Only Bolivia, Peru, and Haiti are in the category of countries with a high level of labor informality in Latin America.

2.3. Background in Argentina

Among the surveyed studies focused on Argentina, the work conducted by Beccaria, Filipetto, & Mura (2021) is particularly relevant for the present paper. Its historical anchoring begins by explaining that the issue of informality in Argentina is certainly recent, but has gained importance in the last few decades. Indeed, before the mid-1970s, Argentina's labor market had significant levels of underemployment, but lower than those observed in most developing countries and with a higher degree of integration than the rest of Latin America (Beccaria, Filipetto & Mura, 2021).

The study then evaluates the period 1975-1990, during which there was a significant growth in the informal sector, especially in unregistered salaried employment. This process intensified in the 1980s and affected businesses of all sizes.

The third time window addressed by the paper internalizes an empirical analysis with revised data from the EPH. The period analyzed extends from 1995 to 2018 and links information from the timely EPH with the continuous EPH, according to the methodological improvement introduced in 2003. Based on stylized facts, the main conclusion of the research is that informal employment in Argentina presents a countercyclical behavior in terms of levels. This result also applies for Brazil and Mexico (Bosch & Maloney, 2008) and is consistent with the degree of informality in the labor market in these countries. In this sense, if the relationship is corroborated, Argentina would belong to the group of economies where unregistered employment plays a role of containment or network effect during contractionary periods. The literature indicates that in countries exhibiting these characteristics, informal employment can function as a buffer, improving family income during economic recessions in the absence of containment policies or unemployment funds (Bizimana & Arzoumanian, 2023). However, the results obtained in this paper relativize the conclusion reached by the authors. By extending the period and considering temporal subspaces, the long-term interactions between informality and cycle in Argentina turn out to be less stable. In addition, by disaggregating total informal employment into different occupational categories, it becomes clear that each element has its own characteristics (see Section 4).

Finally, it is worth mentioning that no bibliography has been identified for Argentina that addresses the issue with data after 2018, which indicates a limitation in updating the available empirical analysis. This is particularly relevant when considering that the data currently available become more robust from 2016 onwards and that they allow for cross-analysis with other variables of interest. In this sense, the present work adds value by incorporating more recent information, thus allowing for an updated characterization of the phenomenon.

3. Empirical strategy and methodology

As mentioned in the Introduction, one of the main difficulties in studying informality is the lack of systematic records, precisely because of the nature of the phenomenon. For this reason, its cyclical analysis has now begun to be internalized by means of sample surveys designed with representativeness criteria.

Two instruments in Argentina collect labor market data covering the formal and informal sectors. One of them is the National Census of Population, Households, and Dwellings, conducted by INDEC. However, it is not possible to perform a cyclical analysis using this instrument, since the census only allows access to cross-sectional data with a ten-year periodicity.

The other one is the EPH, also conducted by INDEC, which collects information from the most representative urban agglomerations in the country. Since it is conducted on a quarterly basis, the EPH allows for more continuous monitoring of the labor market and is more appropriate for the purposes of the present paper. For this reason, it was chosen as the main source for this study.[5]

3.1. General considerations regarding the EPH

The EPH has as its direct antecedent the "punctual" EPH, which was carried out twice a year (in May and October) since 1974. However, the availability of data between that year and 2002 is limited due to discontinuities in the series. Beginning in the third quarter of 2003, the INDEC implemented a pilot plan that marked the beginning of the continuous mode. Since 2004, the "continuous" EPH has been carried out on a regular quarterly basis, which allows for a more dynamic monitoring of the labor market.

Currently, the survey is based on a probabilistic and stratified sample distributed in 32 urban agglomerations of Argentina with more than 500,000 inhabitants. Therefore, the information it generates is of an inferential nature. Although it estimates figures for the country as a whole, it does not extend to small- and medium-sized localities.[6] This poses a constraint on the scope of the results obtained in this study that should be explicitly mentioned, as they are specifically limited to the urban setting.

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[5] Recently, in April 2025, INDEC began to publish an annual report on a quarterly basis that addresses labor informality based on new features introduced in the EPH questionnaire since 2023.Q4. The methodology used by the agency seems to be similar to the one proposed in the present paper. In future studies, both methodologies will be compared in detail.

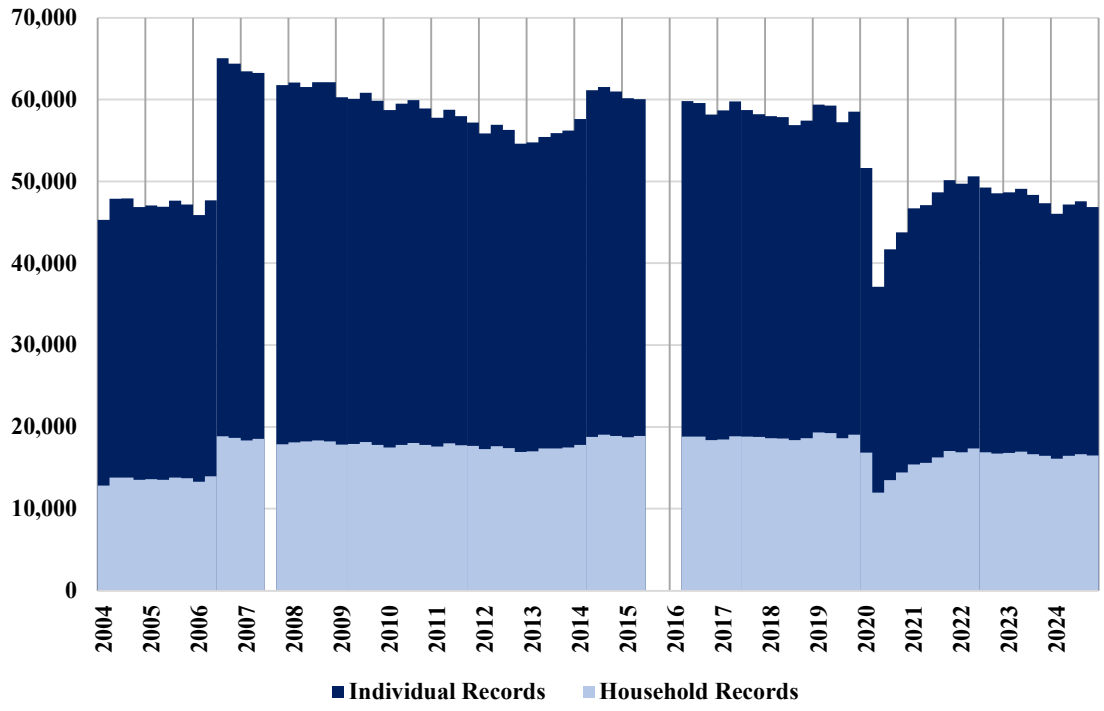
[6] Small- and medium-sized localities account for most of the employment in agriculture, a sector with a high level of informality in Latin America. Despite the importance of agricultural activity in Argentina in terms of output (8.0%) and exports (29.0 %), it actually employs approximately 7.0 % of the workforce (CEPAL, 2024).

Concerning the temporal space, data were taken from the first quarter of 2004 onwards. This is because the methodological change implemented in 2003, which marks the beginning of the continuous EPH, includes questions in the survey that cannot be linked to the specific EPH. Although some series could be linked, the key variables for this research start from that time. Specifically, we worked with the bases corresponding to the first quarter of 2004 up to and including the fourth quarter of 2024.

A second issue that should be mentioned is that the EPH microdata, along with other statistics of the agency, were subject to political interventions from 2007 to 2015. In 2016, INDEC undertook reconstitution tasks, but the data for 2015.Q3, 2015.Q4, and 2016.Q1 could not be amended. These three periods are treated as "unavailable" in all subsequent statistical-econometric approaches.

As a result of the above, we worked with a total of 80 surveys (see Figure 1) that cover the EPH from 2004.Q1 to 2024.Q4, excluding 2007.Q3, 2015.Q3, 2015.Q4, and 2016.Q1. In the case of the missing dataset for 2007.Q3, it was decided to take an average between 2007.Q2 and 2007.Q4. In the following three cases, it seemed appropriate to split the dataset into two packages without estimating the missing figures.

Figure 1 | Number of individual and household records considered in the EPH.



Source: Authors' own elaboration based on data from the Permanent Household Survey, INDEC.

3.2. Internalization of informality within the framework of the data package

The general criterion used to capture informality in each occupational category considered in the EPH is explained below (Appendix 1 presents a complete conceptual framework for each category). In principle, an attempt was made to respect the resolutions and proposals of the 21st International Conference of Labour

Statisticians (International Labour Organization [ILO], 2023), the recent formulations of the World Bank, and the specific considerations of the Economic Commission for Latin America and the Caribbean (ECLAC) for Latin America.

In this context, a first filter on the EPH microdata was used to disaggregate the total occupation into four occupational categories directly derived from the EPH, with no need to combine variables: salaried workers (workers with a dependent relationship), employers, self-employed workers (without a dependent relationship), and unpaid family workers. This classification is the one used by INDEC and is in line with the methodological proposal of the ICLS 2023. Based on this typology and by cross-checking with other relevant variables,[7] the level of informality within each occupational category was estimated for each quarter of the period analyzed. **Appendix 2** summarizes the technical specifications of the queries carried out in each case (see **Table A2.A**).

Informal salaried workers. Based on a broad criterion of informality, informal salaried workers are those whose main activity does not include pension deductions from their salary. This approach is in line with the notion of employment relationship proposed by the ICLS, as well as with the definition adopted by ECLAC (2024). Although a more restrictive criterion could be applied that includes other dimensions related to the quality of employment (e.g., the lack of paid vacations, medical coverage, or other labor benefits), the specialized literature tends to use exclusively the absence of pension contributions as the main indicator of labor informality in this occupational category.

Informal employers. To identify informal employers, a set of survey questions is used to inquire about the legitimacy of the business constitution that supports their activity. This approach seeks to be consistent with the ICLS proposal, which defines informality in this group in terms of compliance with the fiscal and company responsibilities implied by their role as employers.

Informal self-employed workers. For this category, the ICLS also advises considering informality in the face of fiscal responsibility. However, there is no direct question in the EPH that addresses this issue. Therefore, the filter takes into account access to medical coverage or discounts associated to the worker. This is due to a regulatory aspect in Argentina that requires registered self-employed workers to have social security, mutual, and/or prepaid health insurance. Otherwise, discounts are computed that are not sufficient to cover full coverage.

Unpaid family workers. In this case, the workers included in the unpaid category are usually considered informal, since their employment relationship does not involve a contract, registration, or social protection.

[7] Regarding the data collected by the survey, INDEC publishes standardized reports showing the main results of the periodic measurements. Additionally, the raw EPH database (microdata) can be downloaded, enabling users to conduct personalized searches and cross-references. The complete structure of the survey and the different variables that can be consulted are listed in the document “Registration design and structure for the bases” that is periodically updated by INDEC in each new quarterly publication of the EPH.

Although the EPH classifies them as employed, the lack of remuneration and contributions places them, in practical terms, within the informal sector.

The present paper seeks to explore the cyclical relationship of informality, but it also evaluates some qualitative characteristics following a seminal work that provides some hypotheses in this regard. In Chapter III of the report "Economic Survey of Latin America and the Caribbean, 2024: low-growth trap, climate change, and employment dynamics," a group of ECLAC researchers addresses the dimensions of labor informality in a probabilistic manner. In this regard, they propose a probit model[8] that probabilistically analyzes the relationship between informality and some variables that the literature identifies as determinants of the phenomenon. The work articulates harmonized information for 14 Latin American countries (including Argentina), based on 2013 data and controls for 2016, 2019, and 2022.

The main results that emerge from the model estimates indicate that in Latin America: (1) Labor informality is higher among the young and the elderly; (2) The probability that a worker is informal decreases with years of experience, but begins to increase after a certain age; (3) The higher the level of education, the lower the probability that a worker is informal; (4) Women are more likely to be informally employed than men, especially if there are people in the household who need care; (5) In terms of migratory status, being a migrant increases the probability of being an informal worker; (6) In terms of place of residence, estimates show that living in an urban area reduces the probability of being an informal worker (there are no data for Argentina due to survey limitations); (7) Being married or cohabiting reduces the probability of being an informal worker; and (8) Informality varies according to the productive sector, being Trade (15.8%) and Services (37.5%) the most significant ones.

These dimensions of labor informality, as outlined in the ECLAC work, served as a guide and are included in **Section 4.8** of the paper to account for their cyclical sensitivity within the framework of the research. Business size was added to the set of variables proposed in the paper, given its relevance in Argentina (Ferrero & Hisgen, 2021). Conversely, purchasing power was not included in the analysis. In the EPH, the weights that provide the scope of the sample population in terms of income are not available for all quarters. Therefore, the variable was discarded.

3.3. Considerations related to Argentina's business cycle and approach

The analysis of medium-term patterns in economic time series and the identification of their cyclical phases can be approached from different perspectives. To this end, theoretical and methodological issues must be addressed, and a process for determining turning points (the moment at which a phase change occurs) must be established. At the same time, the business cycle of the geographical space in which the specific variables to be analyzed are located (in this case, Argentina) is used as a framework for studying their cyclical movement (Cohan, 2024).

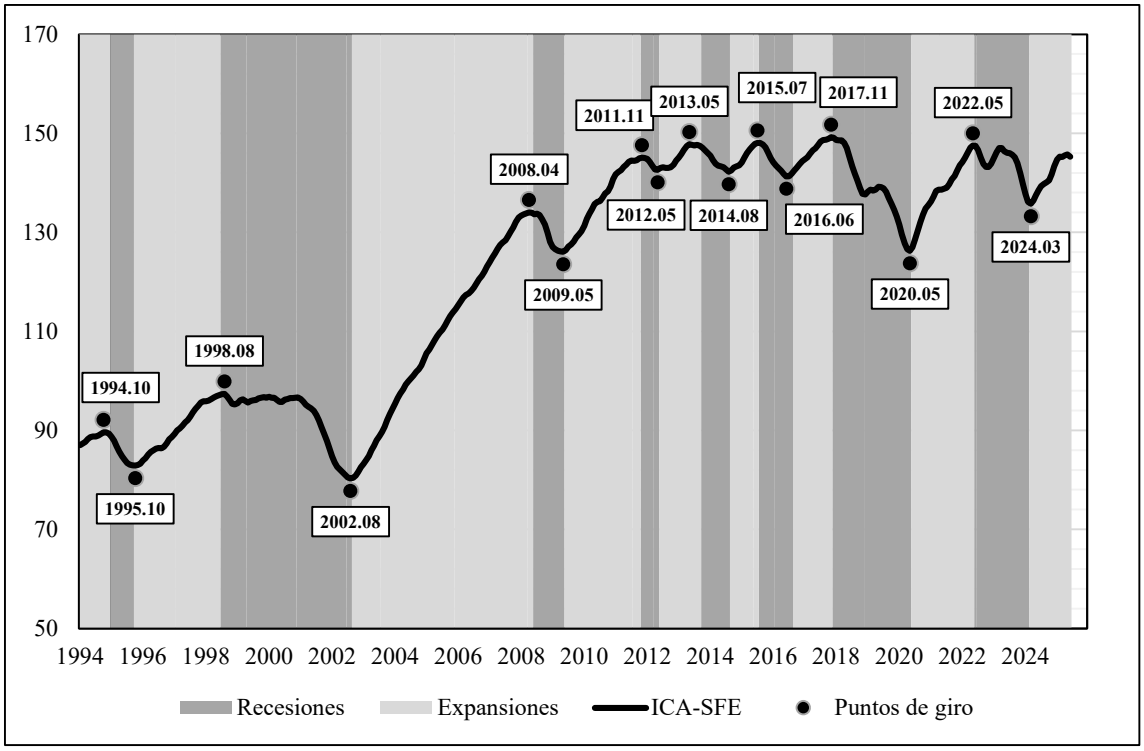
[8] The probit model used allows estimating the probability that a person is an informal worker, given a set of explanatory variables commonly associated with labor informality. Formally, it is modeled as: $P(Y = 1 \mid X) = \phi(\beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k)$, where ϕ denotes the standard normal distribution function.

Given that the EPH package is structured on the basis of quarterly data, Argentina's GDP could be used as an indicator and a reference cycle within the framework of the proposed analysis. However, to achieve more precise results, it is preferable to use as a reference the Coincident Composite Index of Economic Activity of Argentina (ICA-ARG, for its acronym in Spanish). This index is calculated in an ad hoc manner to monitor the contraction and expansion phases of the economy.

The series is published by CICEc on a monthly basis and in real terms, based on 2004 = 100. The coincident index presents data from January 1994 onwards (see **Figure 2**).

Given that the time frame of the paper begins in 2004, the analysis starts during the longest expansion of the series (2002-2008), when Latin America experienced a strong economic boost due to the sustained increase in commodity prices. From that point on, the Argentine economy entered a period of stagnation, during which six classic recessions (falls in the level of activity in absolute terms) were identified. The last but one of these contractionary phases, which began in November 2017, captured the negative effects of the COVID-19 pandemic in 2020.[9]

Figure 2 | Composite Index of Economic Activity (ICA-ARG). Base 2004=100. Classic turns.



Note: Turning points were determined in classical terms (relative peaks and troughs). The dark gray areas indicate Argentine recessions; the lighter shaded areas indicate expansions.

[9] Argentina experienced an extended period of quarantine and closure of activities. Decree 297/2020 established the measure of "Social, Preventive, and Compulsory Isolation" (ASPO, for its acronym in Spanish) in mid-March 2020. The measure was liberalized at the beginning of 2021, but economic activity normalized from the second half of the year (in quarters, the phenomenon extended from 2020.Q2 to 2021.Q2 included).

Source: Authors' own elaboration based on data from the Centro de Investigación del Ciclo Económico (CICEc).

3.4. Time series treatment

3.4.1. Quarterly reporting of the reference cycle

In order to work with the same temporal frequency, the monthly ICA-ARG data were grouped using a simple average of the levels published within each quarter. In accordance with the indicator aggregation methodology, the information is free of seasonality and expressed in real terms, thereby eliminating the need for adjustments for intra-annual frequencies or inflation.

3.4.2. Seasonal adjustment of series

The series that show intra-annual patterns were first deseasonalized before being used as input in subsequent processes. **Appendix 3** provides details of the procedure used for this purpose. Due to the large amount of data to work with, the results were processed in R software. The code used is available for consultation.

3.4.3. Cyclic analysis approach

The preliminary analysis exercises proposed in this paper used series in levels (classical approach). On the other hand, the regressions were performed incorporating information related to rates of change and considering the deviations of each indicator with respect to its trend (growth approach[10]), using a Hodrick and Prescott (HP)[11] filter to capture the long-term movement.

In the classical sense, the determination of turning points for Argentina was carried out following Jorrat (2005), which in turn is based on the guidelines of the *National Bureau of Economic Research* (NBER). This is a nonparametric method, developed in its most widely used version by Bry and Boschan (1971) and structured in three steps: (I) identification of extreme values and their substitution, (II) determination of cyclical changes in the series under analysis and delineation of relative maxima and minima, and (III) specification of turning points in calendar dates.

The complementary way of identifying the location of turning points emphasizes the consideration of the deviations of each indicator from its long-term trend. This approach emerged in the 1960s and, starting with the seminal work of Mintz (1974), became known in the literature as the "growth approach." This approach is also related to other works of that period, such as that of Lucas (1972), later complemented (though with different nuances) by Kydland & Prescott (1982) in the real business cycles approach. In short, the growth approach establishes the turning points of each phase in the months in which the distance between the series of index levels and its trend is maximum in the environment relative to each cycle. Following the

[10] In the growth approach, the turning points of each cyclical phase are located where the deviation from the trend becomes maximum/minimum. In this approach, each state of the cycle is considered to be an acceleration/deceleration, rather than a contraction/expansion as proposed by the classical approach.
[11] Following authors such as Uribe & Schmitt-Grohé (2017) and Kydland & Prescott (1990), a Hodrick and Prescott (HP) filter was used. It was set as a parameter $\lambda = 1.600$, which is proposed in the specialized literature for quarterly series. The topic is expanded in **Appendix 3**.

considerations of Uribe & Schmitt-Grohé (2017), this is the approach adopted to consider cycles in this paper.

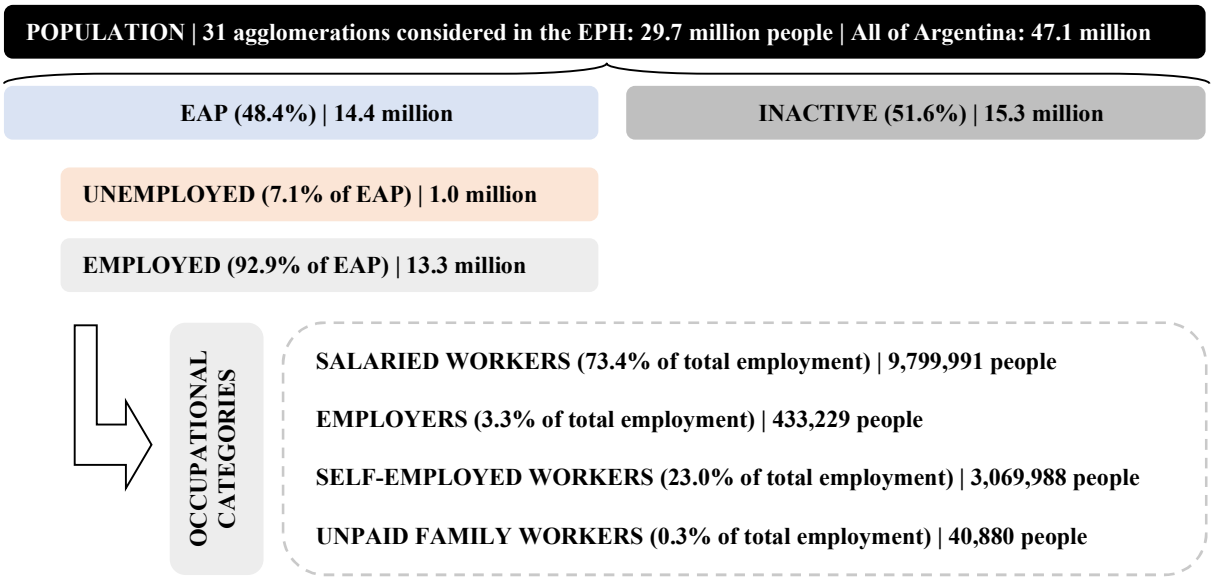
It is worth mentioning that the nonparametric methods described above are still actively used globally for the determination of turning points at the technical level (European Union and the United Nations, 2017). From an academic point of view, parametric methods provide more theoretical support for the identification of phases, since the determination is endogenous.[12] However, comparisons show that the dates determined by parametric and nonparametric methods are practically the same (Anas & Ferrara, 2004). It is therefore advisable to continue using them, given their proven effectiveness and ease of implementation.

4. Stylized facts for informal employment and the cycle in Argentina

4.1. Descriptive statistics of the labor market in Argentina based on the EPH[13]

The general structure of the regular reports on the labor market that INDEC prepares from the EPH is presented below, based on data from the fourth quarter of 2024:

Figure 3. Labor market structure in Argentina (EPH, 2024.Q4).



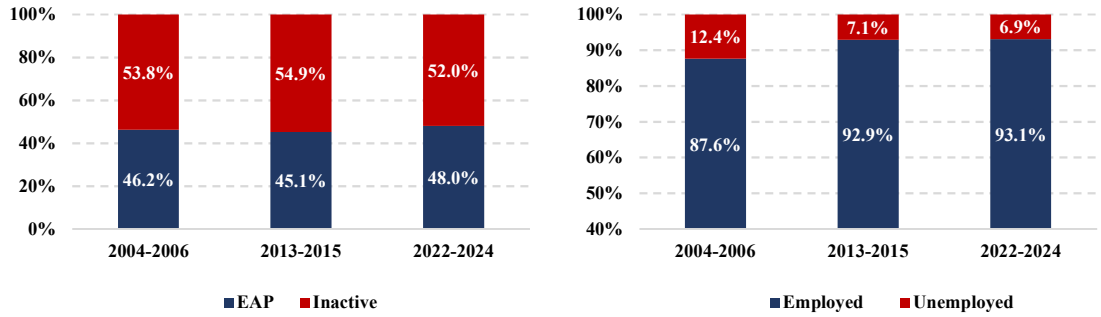
Economically Active Population (EAP) —commonly referred to in English as the labor force— refers to people of working age who are either employed or actively looking for work (unemployed). Inactive population refers to people who are not part of the EAP, including children under the age of 10 (accounting for about 27.0% of the total inactive population), students (33.6%), and housewives (17.2%). The remaining people are retired, younger, or discouraged. For further details regarding the scope of the occupational categories, refer to the comments in Section 3.2.

Long-term dynamics

[12] A widespread method in this line is the application of Markov chain models to determine state changes. See for example (Hamilton, 1994).
[13] From this point on, the mention of Argentina is equivalent to all the agglomerates taken into account by the EPH.

Since 2004, the participation of the EAP in Argentina has grown steadily, from 46.2% in 2004 to 48.4% of the total population at the end of 2024. With regard to unemployment, the high levels reached after the socioeconomic crisis in 2001/02 have stabilized at around 7.0% of the EAP.[14]

Figure 4 | EAP, inactivity, and employment in the labor market in Argentina. All agglomerates surveyed by the EPH. Average relative participation, using quarterly data in a three-year environment.[15]



Source: Authors' own elaboration based on data from the Permanent Household Survey, INDEC.

As previously stated, the EPH enables the differentiation of four occupational categories. The relative proportions of these occupations in total employment are presented below, with no reference to formality and informality.

Table 1 | Occupational categories. Total agglomerates of the EPH.
Average relative proportion from quarterly data in a three-year environment.

Period	**Total employment**	Salaried workers	Employers	Self-employed workers	Unpaid family workers
2004-2006	**100.0%**	74.8%	4.0%	20.1%	1.1%
2014-2016	**100.0%**	76.1%	3.7%	19.7%	0.5%
2022-2024	**100.0%**	73.8%	3.2 %	22.5%	0.4%

Source: Authors' own elaboration based on data from the Permanent Household Survey, INDEC.

As an occupational category, salaried workers account for the largest proportion of employment in Argentina over the entire sample, about 75.0%. This is followed by self-employed workers, whose proportion has increased at the expense of a slight decrease in the remaining categories, accounting for 23.0% in 2024.

4.2. Population, EAP, and inactivity from a cyclical perspective

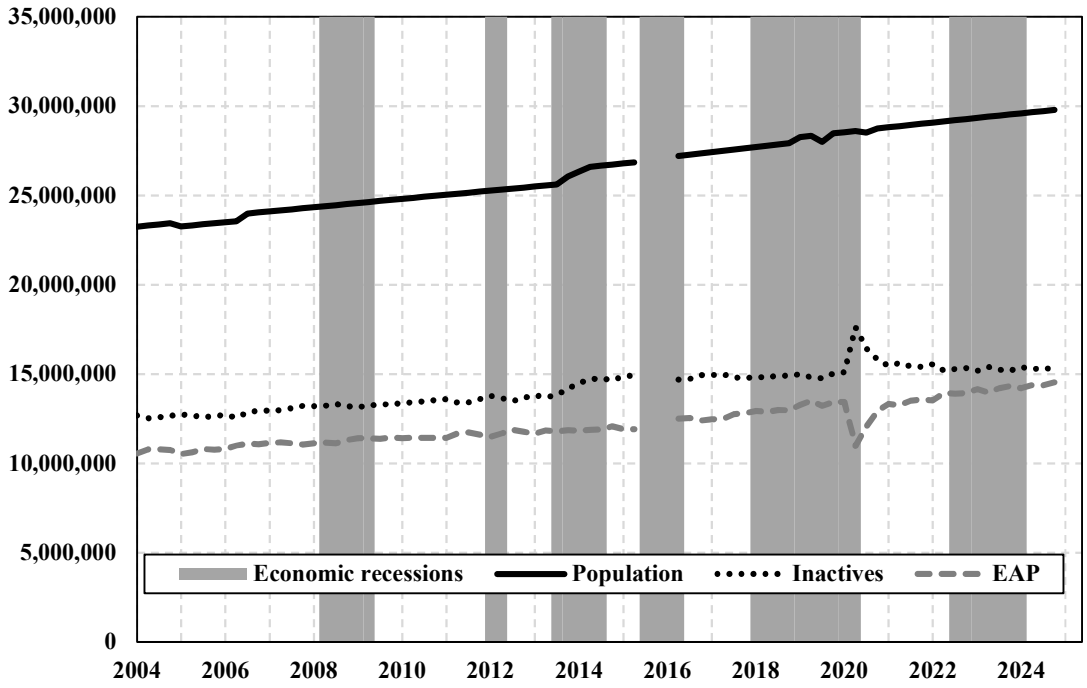
[14] In this regard, the Argentine Social Debt's Observatory of the Universidad Católica Argentina (UCA) proposes in its regular reports that unemployment figures are actually higher than the official ones. To support this statement, they internalize cases of precarious employment, underemployment, and other similar circumstances that do not represent a full state of occupation. This topic is beyond the scope of this paper; for further information see: https://uca.edu.ar/es/observatorio-de-la-deuda-social-argentina/barometro-de-la-deuda-social-argentina/informes-anuales-de-la-deuda-social-argentina.

[15] Arbitrary ranges of three years were taken to gain stability in the results, using three subperiods of the data package: beginning, middle, and end of the period.

Figure 5 shows that the dynamics in the number of inhabitants are not sensitive to the business cycle. The data show a quasi-linear trend that corresponds to the net population growth, which averages around 1.2% per year during the period.

Conversely, EAP and inactivity exhibit cyclical sensitivity between 2004 and 2024. This is because they experienced the impact of the COVID-19 pandemic in the year 2020. During this period, EAP decreased significantly, while inactivity increased. In relative terms, the variation recorded in the second quarter of the year was +16.7% compared to the previous quarter, with approximately 2.5 million people withdrawing from the EAP during the months of stricter confinement imposed on citizens. Subsequently, the situation underwent a reversal until it resumed its normal trajectory as of 2021.

Figure 5 | Population and activity and inactivity levels. Number of inhabitants represented in the nationwide survey.



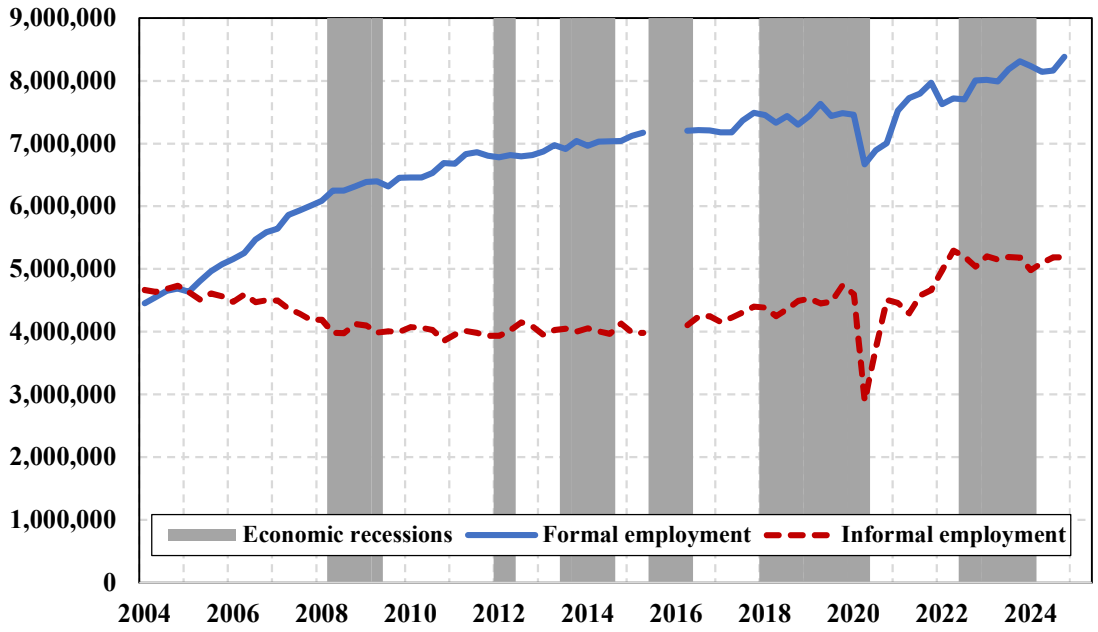
Source: Authors' own elaboration based on data from the Permanent Household Survey, INDEC.

Due to its nature, the COVID-19 effect is not considered part of the cyclical component of the series analyzed; in the authors' opinion, this phenomenon is limited to the erratic component. However, the relevance of the shock and its persistence throughout the year 2020 merit a special consideration of the case. From this point of view, the impact of COVID-19 corresponds to the end of a prolonged classical recession, introducing potential distortions in the long-term stylized facts of the variables.

4.3. Occupation level as a variable: formal and informal

Using a set of seasonally adjusted series,[16] we proceeded to construct two indicators related to the level of employment with a representative scope on a national scale, disaggregating the total into "formal" and "informal" employment. Each of these indicators was constructed by adding the persons listed as "formal" and "informal" in each occupational category, according to the classification obtained by the criteria specified in Section 3.2.

Figure 6 | Formal and informal workers. Number of inhabitants represented in the survey with national coverage. Series filtered by seasonality.



Source: Authors' own elaboration based on data from the Permanent Household Survey, INDEC.

In terms of trends, Figure 6 shows that the long-term growth of the total number of employed people in Argentina over the last two decades was mostly driven by the expansion of formal employment. However, this did not translate into quality jobs; instead, the Argentine labor market incorporated a large number of formal jobs through simplified tax figures that address the problems of low-income sectors and precarious situations (CREEBBA, 2022). Nevertheless, these cases should be included in the formal group, since they cover criteria defined in terms of access to social security and compliance with basic tax and legal obligations.

A second aspect that stands out from the series is that the pandemic had a strong impact on both indicators, although it affected informal employment more severely. This is to be expected given the inability of many workers to report to their workplaces and the impossibility of performing tasks remotely, especially in informal occupations that are not protected by the government like formal occupations. While specific protective measures were applied to formal employment relationships, including leaves of absence and remote working arrangements protected by official regulations, informal employment relationships were

[16] The series had to be seasonally adjusted in two tranches due to missing data for 2015.Q3, 2015.Q4, and 2016.Q1. See Appendix 3 for details on the process followed.

not included in these legal protections. As a result, informal salaried workers were more vulnerable to forced dismissal.

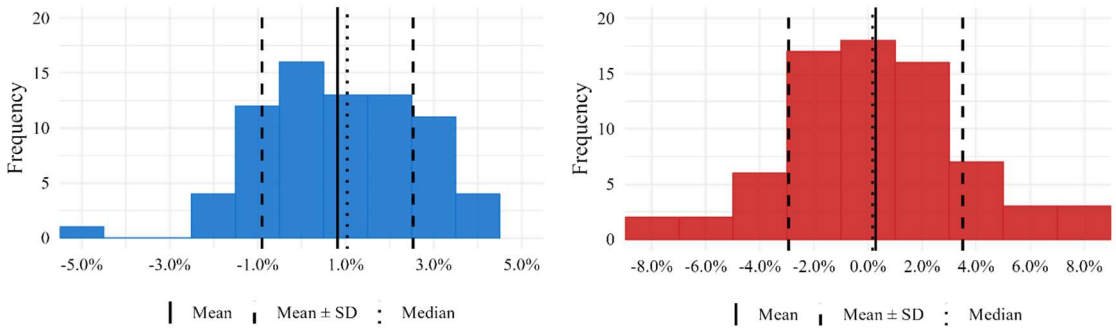
As for the cycle itself, a visual approximation allows recognizing that the two series are indeed sensitive to economic fluctuations. However, their variability is not sufficiently marked to allow a clear identification of a regular or systematic pattern, at least in classical terms.

Figure A4.A in Appendix 4 shows analogous graphs for each occupational category. Note that the silhouettes of the series corresponding to salaried workers, which explain more than 70% of total employment throughout the period, are those that determine the silhouettes of the aggregate variables. The remaining categories show very different paths and are therefore considered as particularized elements in the following exercises.

4.3.1. Variability in quarterly exchange rates: distributions

The data analysis began with an examination of the distribution of quarterly variations in formal and informal employment using histograms segmented into ten intervals. The calculations excluded from the package the statistics corresponding to quarters 2020.Q2 to 2021.Q2 inclusive, in order to avoid distorting the results with the irregular effect of COVID-19.[17]

Figure 7 | Distribution of quarterly variations for each variable. Period 2004. Q1-2024.Q4 (excluding 2020.Q2–2021.Q2).



	Formal employment	Informal employment
Mean	0.81%	0.28%
Median	1.03%	0.17%
Standard deviation	1.72%	3.22%

Source: Authors' own elaboration based on data from the Permanent Household Survey, INDEC.

The histograms in Figure 6 show a greater concentration of positive variation in the series corresponding to formal employment, with a long-term quarterly average of 0.81% and a standard deviation of 1.72%. Informal employment also shows a positive quarterly average growth over the period, but it is only 0.28%,

[17] The containment measure ended at the beginning of 2021, but the tests performed on the data package revealed a persistence of the phenomenon that had a significant impact during the first half of that period.

less than half that of formal employment. Although its volatility (standard deviation) is higher (3.22%), nearly twice the size of the mean, its median is closer to zero.

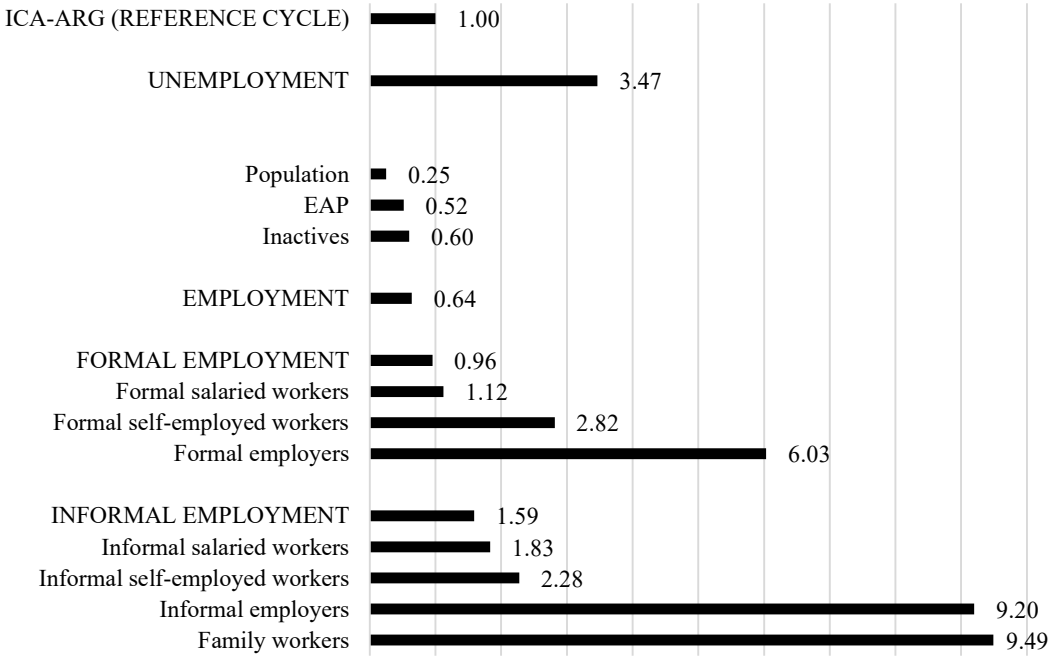
4.4. Volatility analysis of variables with respect to the business cycle

The analysis of the relative volatility of the main variables in this paper with respect to the business cycle is presented next. Volatility was measured according to common practices in finance, where it is captured by the standard deviation of variation rates—in this case, quarterly relative variations. Once the standard deviations of each series had been calculated, they were standardized with respect to the volatility of the business cycle used as a reference. Figure 8 summarizes the results.

With a base volatility of 1.00 for the ICA-ARG, the relative volatility of the population, the EAP, and the inactive population is less than unity; that is, its volatility is lower than that of the business cycle. In contrast, unemployment has a volatility six times greater than that of the reference cycle.

Formal employment has a volatility very similar to that of the cycle (1.04), where formal salaried workers are a key element, being the variable with the largest number of jobs and with a volatility relative to the cycle of 1.23. Within this group, self-employed workers and employers have significantly higher volatilities.

Figure 8 | Volatility of each variable relative to the amplitude of the Argentine business cycle.



Note: The calculations relied on the standard deviations (σ) of quarterly rates of change from each seasonally adjusted series, covering 2004.Q1–2024.Q4 but excluding 2020.Q2–2021.Q2.

Source: Authors' own elaboration based on data from the Permanent Household Survey, INDEC.

The volatility for informal workers as a whole (1.59) is approximately 60.0% higher than that of the reference business cycle. Both informal salaried workers (1.83) and informal self-employed workers (2.28)

display relatively high volatilities, with the latter being clearly more volatile. Informal employers (9.20) and unpaid family workers (9.49) show significantly higher volatilities than the remaining categories, constituting the most volatile elements of informal employment in cyclical terms. It should be noted, however, that these two occupational categories together account for less than 5.0% of all informal employment. Indeed, family workers averaged only 0.31 in 2024, whereas employers represented 2.3% of the informal workers. Therefore, given the sampling nature of the EPH, the results obtained should be taken with reservations.

4.5. Cyclical classification of variables using cross-correlations

This section presents an analysis of the cross-correlations between the quarterly variations of each specific variable and the quarterly variations of the reference cycle (ICA-ARG). Correlation coefficients were calculated contemporaneously (0) and 1 to 4 quarters ahead and lagged. The exercise enables categorizing variables as leading, coincident, or lagging. When the maximum coefficients are found around quarter 0, the variable is usually classified as coincident. Conversely, leading variables present signals ahead of the cycle, with higher coefficients in -4 to -1 quarters. Lagging variables react later to cyclical fluctuations, showing the highest coefficients at +1 to +4 quarters. Additionally, the sign of the coefficients indicates whether the specific variable is procyclical (positive coefficients) or countercyclical (negative coefficients).

Table 2 | Correlation coefficients between the quarterly variations of each variable with respect to the variations of the ICA-ARG. Seasonally adjusted data. Summary of results for +/- four quarters lead and lag. Period 2004.Q1-2024.Q4 (excluding 2020.Q2-2021.Q2).

	-4	-3	-2	-1	0	1	2	3	4
UNEMPLOYMENT	**-0.02**	**0.05**	**-0.07**	**-0.32**	**-0.50**	**-0.42**	**-0.12**	**0.03**	**0.08**
FORMAL EMPLOYMENT	**-0.07**	**0.04**	**0.22**	**0.21**	**0.26**	**0.28**	**0.27**	**0.25**	**0.22**
Formal salaried workers	-0.06	0.05	0.21	0.26	0.24	0.23	0.32	0.28	0.27
Formal self-employed workers	-0.03	-0.10	0.00	-0.06	0.02	0.07	-0.06	0.00	-0.03
Formal employers	-0.00	0.16	0.05	-0.01	0.09	0.10	0.01	-0.00	-0.08
INFORMAL EMPLOYMENT	**-0.07**	**-0.00**	**-0.03**	**-0.13**	**0.00**	**-0.11**	**-0.17**	**-0.25**	**-0.32**
Informal salaried workers	-0.11	0.01	-0.00	-0.08	0.03	-0.12	-0.17	-0.20	-0.27
Informal self-employed workers	0.04	-0.10	-0.08	-0.14	-0.03	-0.08	-0.20	-0.24	-0.27
Informal employers	0.06	0.15	0.00	-0.07	0.06	0.12	0.20	0.04	-0.08
Family workers	0.02	0.07	0.05	0.03	-0.10	-0.09	-0.02	-0.08	-0.02

Note: Shaded cells indicate that the coefficient is statistically significant at the 5% significance level.
Source: Authors' own elaboration based on data from the Permanent Household Survey, INDEC.

Table 2 shows the cross-correlation coefficients for all the indicators analyzed in relation to the reference business cycle. The case of unemployment was included as an interpretative reference, since its cyclical characteristics are extensively documented in the literature. As expected, its highest coefficients are

negative, statistically significant at 5%, and located between -1 and 1 quarters. This classifies the indicator as countercyclical and between coincident and slightly lagged, in line with the stylized facts.

In turn, formal employment presents positive and significant coefficients, indicating procyclical behavior. In terms of time synchronicity, the indicator also presents characteristics between coincident and lagged. This behavior is driven by the evolution of formal salaried workers. The categories related to the self-employed and formal employers show low coefficients without a defined relationship, indicating a rather acyclical classification.

Regarding informal employment as an aggregate (i.e., considering all occupational categories), the largest coefficients are negative, located at 3 and 4; only the latter is statistically significant. This classifies the variable as countercyclical and lagged. However, in this case, the overall result is influenced by the behavior of both informal salaried workers and informal self-employed workers, who also present significant and negative coefficients in quarter 4. On the contrary, the categories of informal employers and family workers do not present any statistically significant coefficient, which classifies these variables as acyclical or with no evident cyclical correspondence when using this analytical tool.

4.6. Synchronicity of variables in terms of the growth cycle

This section approaches the analysis from a growth cycle perspective, where the performance of each indicator relative to its long-term trend becomes significant. Accordingly, the deviation from trend (DT) ratio was used, defined as the ratio between the seasonally adjusted series of each variable (in levels) and its long-term trend calculated with the HP filter:

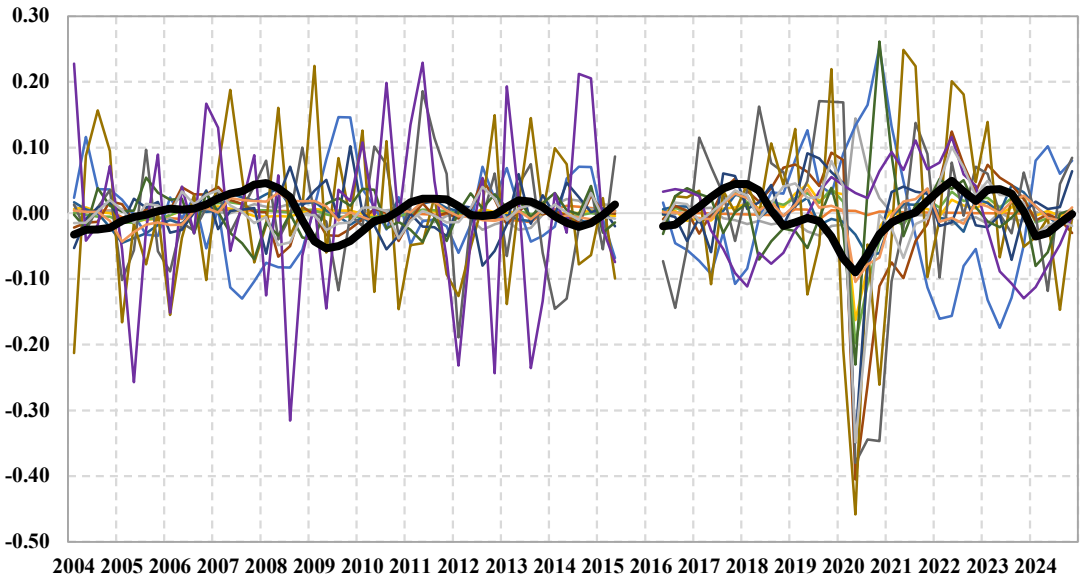
$$DT_i = \frac{Variable_i}{Trend\ HP_i} \quad (1)$$

where i denotes each variable in the data set. In this context, simple linear regressions were performed between the DT of each variable considered and the DT of the reference cycle as an independent variable. It should be clarified that the aim was neither to build a model with several explanatory variables, nor to formulate projections. The purpose was to identify the specific relationship of each variable with the level of economic activity, in terms of their respective trends. To this regard, each DT was subsequently expressed as a percent deviation from trend (PDT), ensuring consistent comparison across variables.
The calculations were carried out without a constant (β_0), which also facilitated the comparison of the slope coefficient (β_1) of each regression.

$$PDT_i = \beta_{1i} PDT_{ICA-ARG} + \varepsilon_i \quad (2)$$

An assumption required by the exercise at the technical level is that the variables considered are stationary.[18] Figure 9 shows the DTs of all series. The DT of the reference cycle (ICA-ARG) is shown in black and highlighted. To test the stationarity of the variables, an augmented Dickey-Fuller (ADF) test was performed. The null hypothesis of the test is that the variable has a unit root (implying nonstationarity). Using a significance level of 5.0%, the statistics and *p*-values obtained enable the rejection of H_0 in all cases. Therefore, the DTs of all the variables are found to be I(0), and it can be assumed that they are stationary.

Figure 9: | Percent deviations from trend for each variable considered.



Note: The PDT of the reference cycle (ICA-ARG) is shown in black and highlighted; the remaining variables are not identified individually because the purpose is to see the movement as a whole.
Source: Authors' own elaboration based on data from the Permanent Household Survey, INDEC.

Next, two sets of regressions were performed. The first was conducted with data from the entire period of analysis: 2004.Q1-2024.Q4. For the second, the analysis considers a limited period,[19] up to the quarter prior to the onset of the COVID-19 pandemic in Argentina: 2004.Q1-2020.Q1. In both cases, information from 2015.Q3, 2015.Q4, and 2016.Q1 was not included for the reasons already explained. Table 3 presents the results obtained.

The first point to highlight is that both the unemployment variable and the formal employment variable show results consistent with the stylized facts. Unemployment has negative and significant coefficients both in the entire period and in the limited period. This implies a countercyclical behavior. On the other

[18] A series is considered stationary if it is stable over time, that is, if its mean, variance, and autocorrelation are constant over time.

[19] As noted above, the level of activity in Argentina was significantly affected by the pandemic between 2021.Q3 and 2024.Q4. This period covers only five quarters and implies a very small sample of data to generate robust regressions.

hand, formal employment presents coefficients with positive signs, indicating procyclical characteristics. It is worth noting that the results gain strength and statistical power when the total period is considered.

Table 3 | Regression results for each variable on ICA-ARG. Estimated model: $PDT_i = \beta_i PDT_{ICA-ARG} + \varepsilon_i$. Based on the percent deviation from trend of each variable, using seasonally adjusted data.

	Regression I - Entire period		Regression II - Pre-COVID-19	
	2004.Q1-2024.Q4 | n = 81		2004.Q1-2020.Q1 | n = 62	
Variables	Coefficients (β_i)	SD	Coefficients (β_i)	SD
UNEMPLOYMENT	**-2.2825** ***	0.1998	**-1.8259** ***	0.3045
FORMAL EMPLOYMENT	**0.3736** ***	0.0763	0.1866 **	0.0711
Formal salaried workers	**0.3230** ***	0.0698	**0.2586** ***	0.0787
Formal self-employed workers	0.3456	0.2106	-0.2222	0.1905
Formal employers	**1.3320** ***	0.3872	0.3527	0.3977
INFORMAL EMPLOYMENT	**0.8037** ***	0.1799	-0.1139	0.1282
Informal salaried workers	**1.1187** ***	0.2319	-0.0153	0.1757
Informal self-employed workers	0.0849	0.2106	**-0.3810** ***	0.1413
Informal employers	1.0932 **	0.4585	-0.0203	0.4987
Family workers	-0.4586	0.4314	-0.6618	0.6712

References: (***) significant at 1%; (**) significant at 5%; (*) significant at 10%.
Source: Authors' own elaboration based on data from the Permanent Household Survey, INDEC.

The results for informal employment are quite different depending on the period considered. In the prepandemic period, all five regressions show coefficients with a negative sign. However, only the variable related to the category of informal self-employed is statistically significant, which implies that the other three categories and informal employment as a whole do not show any particular cyclical correspondence. On the contrary, when adding the pandemic and postpandemic periods, four of the five coefficients become positive, with three reaching statistical significance. Among them, aggregate informal employment shows a significant procyclical relationship.

In sum, the results support the statement that informal employment in Argentina has slightly countercyclical characteristics in some periods. However, not all occupational categories are equally sensitive to cyclical fluctuations. Moreover, since the pandemic, the long-run relationship is inverted in all occupational categories. This implies that the stylized fact between informal employment and the cycle in Argentina is not as stable as the stylized fact for formal employment, which has a stronger relationship with the cycle.

4.7. Occupancy level elasticity

This section analyzes the sensitivity of the labor market with respect to each occupational category, disaggregated into formal and informal. For this purpose, a multiple regression was proposed, taking the first difference of the logarithms of each variable, by means of a log-log econometric model. In general:

$$\Delta \log (y_t) = \log (y_t) - \log (y_{t-1}) \quad (3)$$

In an extended form, the exercise involved regressing the total number of persons employed (dependent variable) against the formal and informal components of each occupational category (explanatory variables), which enabled the analysis of the elasticities of the level of employment with respect to its components:

$$\begin{aligned} \Delta \log employment \\ &= \beta_1 \Delta \log salaried\ workers\ (formal) \\ &+ \beta_2 \Delta \log salaried\ workers\ (informal) \\ &+ \beta_3\ \Delta\ self\ employed\ workers\ (formal) \\ &+ \beta_4\ \Delta\ self\ employed\ workers\ (informal) \\ &+ \beta_5\ \Delta employers\ (formal) + \beta_6\ \Delta employers\ (informal) \\ &+ \beta_7\ \Delta family\ workers\ (informal) + \varepsilon \end{aligned} \quad (4)$$

Table 4 below shows the regression coefficients for each variable. As expected, the results show that all variables have statistically significant coefficients. This means that all variables are individually relevant in the model, albeit with different elasticities.

Table 4 | Elasticities of total employment to changes in occupational categories

	Regression III – Entire period	
	2004.Q1-2024.Q4 | n = 81	
Variables	Regression coefficient	Standard error
Δ log salaried workers formal	**0.5976** ***	0.0105
Δ log salaried workers informal	**0.2494** ***	0.0161
Δ log self-employed workers formal	**0.1019** ***	0.0128
Δ log self-employed workers informal	**0.1181** ***	0.0146
Δ log employers formal	0.0084	0.0074
Δ log employers informal	0.0020	0.0045
Δ log family workers informal	0.0043	0.0049

References: (***) significant at 1%; (**) significant at 5%; (*) significant at 10%.
Source: Authors' own elaboration based on data from the Permanent Household Survey, INDEC.

Likewise, it is evident that the level of total employment in Argentina during the period analyzed shows the highest degree of elasticity with respect to proportional changes in the total number of salaried workers. This is reasonable considering that this variable concentrates the largest number of jobs and shows the heterogeneity in relation to the remaining categories. In addition, the coefficient of formal salaried workers doubles that of informal salaried workers.

In the third and last place, within the category of self-employed workers, the informal component has a slightly higher coefficient than that of the formal segment. This result is also to be expected, given that this is the category with the highest proportion of informal workers in relation to formal workers.

4.8. Peculiarities of population subgroups: sociodemographic dimensions of labor informality

The most relevant results with respect to the aim of this paper have already been presented above. In this last section, we provide a complementary descriptive analysis of informality in Argentina in terms of different sociodemographic dimensions.

A new filtering of the EPH microdatabases (see technical criteria used in Table A2.B in Appendix 2) was implemented to disaggregate the four occupational categories related to labor informality by gender, age, level of education, marital status, place of birth, firm size, and economic sector.

By internalizing these statistics, the purpose pursued was limited to considering each dimension in relation to two issues: (a) proportions and (b) volatility. We kept considering volatility as the standard deviation of the quarterly variations of each variable.

As a global result, the exercise reinforces the position reached by the specialized literature. Informality in Argentina is a complex phenomenon, with marked heterogeneities depending on the particular characteristics of the affected population, as seen in other countries worldwide. This situation supports our initial hypothesis, according to which public policies must necessarily consider these aspects and calibrate the proposals to achieve efficient responses.

Table 5 presents the relative importance of informality and its volatility within each occupational category before moving on to the discussion of their sociodemographic characteristics.

Table 5 | Average proportion and volatility of occupational categories by formal and informal employment, 2004.Q1–2024.Q4 (excluding 2020.Q2–2021.Q2)

	AVERAGE PROPORTION (%)		VOLATILITY (σ)	
Employment	**Formal**	**Informal**	**Formal**	**Informal**
Salaried workers	63.0%	37.0%	2.0%	3.7%
Employers	69.8%	30.2%	10.6%	14.9%
Self-employed workers	50.7%	49.3%	4.8%	4.3%
Unpaid family workers		100.0%		21.3%

Source: Authors' own elaboration based on data from the Permanent Household Survey, INDEC.

4.8.1. Gender

The first dimension considered separately is gender. The question we sought to answer was whether women in Argentina were more exposed to an environment of labor vulnerability than men during the period under study.

In terms of proportions, considering long-term averages, the number of men and women listed as informal salaried workers in Argentina is very similar (see Table 6). In contrast, women account for a smaller share among informal self-employed workers (28.8%) and employers (35.9%), where men clearly predominate. Conversely, women are the majority in the category of unpaid family workers, where they represent, on average, 63.8% of the total.

Table 6 | Average proportion and volatility of informal employment by gender, 2004.Q1-2024.Q4 (excluding 2020.Q2-2021.Q2).

	AVERAGE PROPORTION (%)		VOLATILITY (σ)	
Gender	**Men**	**Women**	**Men**	**Women**
Informal salaried workers	51.4%	48.6%	4.2%	4.6%
Informal employers	64.1%	35.9%	14.9%	24.3%
Informal self-employed workers	71.2%	28.8%	5.1%	8.4%
Unpaid family workers	36.2%	63.8%	32.7%	22.2%

Source: Authors' own elaboration based on data from the Permanent Household Survey, INDEC.

In terms of volatility, the data show clear differences between genders. In all occupational categories except family workers, where they are the majority, women experience more job instability than men over the period. Among informal salaried workers, however, volatility levels are relatively similar between men and women.

4.8.2. Age

The second dimension considered was age. The underlying hypothesis to be tested was whether younger workers and older adults in Argentina were more exposed to labor informality.

The package was disaggregated into four age groups: under 18, between 18 and 30, between 30 and 50, and over 50. The figures obtained clearly show that those aged between 18 and 50 constitute the majority in all occupational categories The proportion of minors is only significant among unpaid family workers (15.5%), while it is marginal in the other groups.

Table 7 | Average proportion and volatility of informal employment by age group, 2004.Q1–2024.Q4 (excluding 2020.Q2–2021.Q2)

	AVERAGE PROPORTION (%)				VOLATILITY (σ)			
Age	**< 18**	**≥ 18 & < 30**	**≥ 30 & < 50**	**≥ 50**	**< 18**	**≥ 18 & < 30**	**≥ 30 & < 50**	**≥ 50**
Informal salaried workers	2.1%	37.7%	40.7%	19.6%	37.3%	5.9%	4.4%	6.2%
Informal employers	0.2%	11.1%	49.3%	39.4%	NA	60.2%	23.9%	28.8%
Informal self-employed workers	0.9%	19.2%	49.7%	30.2%	55.6%	10.3%	6.0%	7.3%
Unpaid family workers	15.5%	35.7%	24.3%	24.5%	118.2%	263.0%	39.8%	42.7%

Source: Authors' own elaboration based on data from the Permanent Household Survey, INDEC.

Among those over 50, the distribution is relatively spread across all categories, with the highest shares among employers (39.4%) and the self-employed (30.2%).

In terms of data variability, instability is particularly pronounced among young workers –especially those aged 18–30– whereas older adults also display higher variability than the core working-age group, though to a lesser extent.

4.8.3. Level of formal education attained

The third question we sought to test was whether low levels of educational attainment in Argentina were associated with more vulnerable employment relationships.

Table 8 shows that a significant proportion of informal workers are among those who have not completed secondary education. Conversely, those with tertiary, university, or postgraduate studies exhibit a lower participation in all occupational categories, with the exception of informal employers, where their share is relatively high. In summary, the informal labor market in Argentina consists mainly of workers with low educational qualifications.

Table 8 | Average proportion and volatility of informal employment by education attainment, 2004.Q1–2024.Q4 (excluding 2020.Q2–2021.Q2)

	AVERAGE PROPORTION (%)				VOLATILITY (σ)			
Formal education	**Incomplete secondary education**	**Complete secondary education**	**Incomplete higher education**	**Complete higher education**	**Incomplete secondary education**	**Complete secondary education**	**Incomplete higher education**	**Complete higher education**
salaried workers	54.6%	24.3%	12.3%	8.8%	6.8%	6.1%	7.7%	9.1%
employers	25.6%	26.8%	15.3%	32.3%	121.6%	30.8%	42.2%	28.5%
Self-employed	62.2%	24.0%	8.4%	5.4%	12.4%	9.3%	16.9%	19.9%
Unpaid family workers	50.0%	23.0%	18.8%	8.2%	75.8%	33.2%	52.9%	152.9%

Note: Regarding the formal education levels in Argentina, the category "*incomplete secondary education*" includes people with no formal education or those who attended kindergarten, preschool, primary education, basic general education (EGB, for its acronym in Spanish), secondary education, and/or polymodal education. The category "*higher education*" encompasses tertiary, university, and postgraduate studies.

Source: Authors' own elaboration based on data from the Permanent Household Survey, INDEC.

When volatility is considered, instability tends to increase with educational attainment among informal salaried and self-employed workers. In the case of employers, the highest volatility is observed among those with incomplete higher education, whereas for unpaid family workers it reaches extreme levels among those with complete higher education. This aspect is relevant and, although it is beyond the scope of this paper, we hypothesize that this instability may be related to greater interaction with the formal labor market.

4.8.4. Marital status

The fourth element under consideration was related to the hypothesis that those who are married or cohabiting have less employment volatility compared to those who are separated, widowed, or single. Table 9 confirms this pattern: across all occupational categories, the latter group consistently exhibits higher levels of instability.

Table 9 | Average proportion and volatility of informal employment by marital status, 2004.Q1–2024.Q4 (excluding 2020.Q2–2021.Q2)

	AVERAGE PROPORTION (%)		VOLATILITY (σ)	
Marital status	**Cohabitant and married**	**Separated, widowed, and single**	**Cohabitant and married**	**Separated, widowed, and single**
Informal salaried workers	47.7%	52.3%	4.4%	4.7%
Informal employers	80.3%	19.7%	17.3%	29.3%
Informal self-employed workers	61.8%	38.2%	5.6%	7.1%
Unpaid family workers	46.6%	53.4%	24.7%	32.8%

Source: Authors' own elaboration based on data from the Permanent Household Survey, INDEC.

4.8.5. Place of birth

In this case, the labor exposure of immigrants within informality was analyzed using a proxy variable related to place of birth. Workers born in Argentina were compared with local workers who were born in other countries.

Table 10 | Average proportion and volatility of informal employment by nationality, 2004.Q1–2024.Q4 (excluding 2020.Q2–2021.Q2)

	AVERAGE PROPORTION (%)		VOLATILITY (σ)	
Place of birth	**Born in Argentina**	**Born in another country**	**Born in Argentina**	**Born in another country**
Informal salaried workers	92.2%	7.8%	4.0%	13.5%
Informal employers	92.5%	7.5%	15.0%	85.0%
Informal self-employed workers	90.4%	9.6%	4.9%	14.7%
Unpaid family workers	93.4%	6.6%	20.8%	227.1%

Source: Authors' own elaboration based on data from the Permanent Household Survey, INDEC.

The data are unequivocal: although foreigners constitute less than 10% of the labor force on average, they consistently exhibit much higher levels of volatility –particularly among employers and unpaid family workers, where instability reaches extreme values–.

4.8.6. Firm size

Then, the relationship between the size of the production unit where the worker is employed and labor informality was examined. Three categories were filtered: businesses with five or fewer workers (including sole proprietorships and self-employed individuals), businesses with six to forty workers, and businesses with more than forty workers.

In fact, from the point of view of proportions, there is a high concentration of informal employment in businesses with five or fewer workers. Furthermore, due to their nature, many self-employed workers work individually. In addition, the categories of informal salaried workers and employers are represented by nearly 25.0% in establishments with six to forty workers.

Table 11 | Average proportion and volatility of informal employment by firm size, 2004.Q1–2024.Q4 (excluding 2020.Q2–2021.Q2)

	AVERAGE PROPORTION (%)			VOLATILITY (σ)		
Number of workers	**≤ 5**	**6 to 40**	**> 40**	**≤ 5**	**6 to 40**	**> 40**
Informal salaried workers	55.1%	34.0%	10.9%	7.3%	7.4%	11.8%
Informal employers	72.5%	26.1%	1.4%	18.5%	34.0%	391.5%
Informal self-employed workers	99.6%	0.4%	0.0%	6.8%	149.1%	NA
Unpaid family workers	93.4%	6.4%	0.2%	22.7%	385.0%	NA

Note: The figures designated with "NA" refer to values that could not be calculated or whose proportions were so low as to render them irrelevant.
Source: Authors' own elaboration based on data from the Permanent Household Survey, INDEC.

With respect to volatility, the results obtained do not indicate a univocal meaning, indicating that instability is not evenly distributed across firm size. In fact, the high concentration of data in the first group listed detracts from the depth of the figures for the other two groups.

4.8.7. Sector

The last dimension considered was the economic sector in which the employee works. Here, the data package was consistent from the second quarter of 2016 onwards, so previous quarters were not considered.

To classify the information, industry and commerce were singled out, along with the construction and accommodation and food services (AFS) sector. These activities are marked by a high degree of informality in Argentina; therefore, it is reasonable to consider them in particular. The remaining sectors were aggregated into a single element: "all others."

Table 12 shows the relative importance of the commercial sector in the informal labor market, with average proportions ranging from 17.0 % to 57.0 %, depending on the occupational category. The other three groups analyzed also concentrate high percentages of informal workers.

Table 12 | Average proportion and volatility of informal employment by sector, 2004.Q1–2024.Q4 (excluding 2020.Q2–2021.Q2)

	AVERAGE PROPORTION (%)					VOLATILITY (σ)				
Economic sector	**Industry**	**Building**	**Commerce**	**AFS**	**All others**	**Industry**	**Building**	**Commerce**	**AFS**	**All others**
Informal salaried workers	9.7%	13.7%	17.0%	6.0%	53.6%	11.7%	10.5%	6.6%	15.2%	5.2%

Informal employers	14.6%	5.6%	37.2%	10.3%	32.3%	44.7%	65.2%	30.3%	82.7%	24.6%
Informal self-employed	12.3%	23.0%	64.4%	3.3%	28.8%	15.2%	14.2%	6.0%	43.2%	9.4%
Unpaid family workers	15.7%	2.8%	57.0%	9.3%	15.2%	53.3%	171.4%	27.9%	177.6%	210.7 %

Source: Authors' own elaboration based on data from the Permanent Household Survey, INDEC.

With regard to the volatility of the sectors in the occupational category, it is not easy to offer precise comments without studying the package in more detail. However, note the great heterogeneity of the figures in terms of amplitude, which is in line with the results obtained and the observations included throughout the paper.

5. Concluding remarks

Focusing on the dynamics of the last twenty years, informal employment in Argentina remained very stable, fluctuating slightly around five million workers. The formal sector, on the other hand, experienced sustained growth, increasing from four to eight million workers between 2004 and 2024.

Although the informal sector exhibited a stable trend in terms of cyclical amplitude, it showed a relative volatility that was approximately 60.0% higher than that of the reference business cycle. This result is supported by the behavior of informal salaried workers, who accounted for around 70.0% of the total number of unregistered workers. However, the same behavior was particularly evident among employers and unpaid family workers, with an even more pronounced volatility relative to the cycle, reaching 9.20 and 9.49 times higher, respectively. The exception was the self-employed, whose cyclical volatility was very similar to that of the formal and informal sectors.

Regarding the central aim of the paper, the stylized facts between informal employment and the Argentine business cycle were assessed using various tools, beginning with a cross-correlation analysis.

When labor informality was considered as a single element that includes all occupational categories simultaneously, the results indicate that unregistered employment in Argentina exhibited slightly countercyclical characteristics during the period under analysis. These characteristics were modest in intensity and exhibited a temporary behavior that lagged behind the business cycle.

The general result presented in the previous paragraph was obtained mainly on the basis of the behavior of informal salaried and self-employed workers. On the other hand, the categories of informal employers and unpaid family workers did not show a statistically significant correlation coefficient, which would classify these variables as acyclical or with no evident cyclical correspondence.

An analysis of the synchronicity of the variables within the framework of a growth cycle approach was carried out in order to extend the preliminary results. To this end, the deviations of each indicator from its long-term trend were contrasted, which enabled the addition of some elements of interest.

First, there was a clear comovement between the different occupational categories that make up the informal labor market in Argentina. This allowed the standardization of the variables in terms of their trend, focusing on the short- and medium-term movements where distinctive elements were observed.

The regressions performed between each variable and the Argentine business cycle also indicate that informal employment in Argentina showed some countercyclical characteristics within the period of analysis. However, the result had to be limited to the period before the COVID-19 pandemic and could not be extended to all occupational categories. In fact, only the self-employed obtained a statistically significant coefficient in the regressions.

When the same exercise was performed with all the data in the package, including the pandemic and post-pandemic information, the stylized facts broke down. This indicates that the long-term relationship was significantly weaker than the that between formal employment and the cycle.

Regarding the intensity of the movement, there was no significant effect that could indicate that informal employment in Argentina functioned as a social safety net during economic recessions, as suggested by the literature for other countries. This result, however, did not prevent the proportion of informal/formal employment from increasing during recessions. This is because formal employment tended to be procyclical and coincident, falling in synchrony with economic contractions, while informal employment rose slightly and with a lag. In other words, the maximum improvement in informal employment occurred well into the economic recovery. Furthermore, three out of the four occupational categories obtained nonsignificant coefficients in the regressions corresponding to the pre-pandemic period, indicating that their behavior did not exhibit a clear cyclical anchor.

Another aspect evaluated in the study was the capacity of the different occupational categories to generate employment. As expected, given the proposed framework, formal and informal salaried workers had the highest coefficients because they represented the largest segment of the workforce. Notably, the coefficient of formal salaried workers doubled the relative coefficient of informal salaried workers.

The final aspect addressed by the paper focused on the identification of particularities within the structure of the Argentine informal labor market, again exploiting the possibilities offered by the filtering of sample information. The aim was to make a complementary contribution and to provide evidence in support of the complexity of the problem, emphasizing the need for public policies to be sufficiently calibrated to achieve an efficient penetration of the informal labor market.

Different dimensions related to gender, age, educational level, marital status, migrant status, firm size, and the sector in which workers work were analyzed. The exercise focused on comparing the proportions and relative volatilities of the variables within the period studied. In summary, it is worth noting the clear heterogeneities present when contrasting the formal labor market with the informal labor market, as well as among the different informal occupational categories.

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Appendix 1: EPH occupational categories

The definitions provided in this appendix are textual transcriptions obtained from the methodological documents provided by INDEC in this regard (https://www.indec.gob.ar/indec/web/Nivel4-Tema-4-31-58).

*"...The **occupational category** is an important dimension for the characterization of production relations. In the EPH, this dimension is measured through a battery of indicators that limits the biases of the interviewee's perception of his/her employment situation and improves the traditional approach based on a single question. The fundamental criterion present in the questions addressing this issue is that of "use of the labor force." This criterion sustains the traditional discrimination between those who buy labor force (employers), those who use their own labor force (own-account workers), and those who sell their labor force in the market (salaried workers) ...."*

*"...A **salaried worker** is considered to be any person who works in a relationship of dependence, which means that the organizational forms and production conditions are given to him/her as well as the instruments, facilities, or machinery, and he/she contributes his/her personal labor. This category also includes workers who do not work at the employer's domicile, but are related to a single establishment ...."*

*"...**Employers** are those who work without a relationship of dependency, which means that being the sole owners or active partners of a business, they establish the conditions and organizational forms of the production process and employ at least one salaried person. They contribute to the production process with the necessary instruments, machinery, or facilities ...."*

*"...**Self-employed workers** are those who carry out their activity using only their own personal labor, that is, they do not employ salaried personnel (or employ them only sometimes or seasonally) and use their own machinery, facilities, or instruments ...."*

*"...Finally, **unpaid family workers** are considered to be persons employed in an economic establishment run by a member of their family—who may or may not live in the same household—and who do not receive payment in cash or in kind for their work and do not withdraw any money ...."*

Appendix 2: Parameters used to filter the EPH microdata

Table A shows a summary of the fields used to calculate each of the variables from the EPH microdata package. Note that in cases with missing interviews and/or "don't know/no answer" responses, these statistics were excluded from the sample by reweighting the subtotals. None of these situations was statistically significant.

Table A2.A: General variables and formal and informal occupational categories.

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VARIABLE	DISAGGREGATION INTO GROUPS	EPH FIELD
POPULATION	Number of inhabitants relative to the sample	PONDERA
EAP	EAP = Employed and Unemployed	ESTADO = 1 + 2
INACTIVE	Inactive (by difference) = Population - EAP	By subtraction
EMPLOYMENT	Employed workers	ESTADO = 1
UNEMPLOYMENT	Unemployed workers	ESTADO = 2
OCCUPATIONAL CATEGORIES	Salaried workers	CAT_OCUP = 3
	Employers	CAT_OCUP = 1
	Self-employed workers	CAT_OCUP = 2
	Unpaid family workers	CAT_OCUP = 4
SALARIED WORKERS	Formal salaried workers	PP07H = 1
	Informal salaried workers	PP07H = 2
EMPLOYERS	Formal employers	PP06E = 1
	Informal employers	PP06E = (2 + 3) y PP06H = (1 + 2)
SELF-EMPLOYED WORKERS	Formal self-employed	CH08 = (1 + 2 + 3)
	Informal self-employed	CH08 = 4
UNPAID FAMILY WORKERS	Informal by definition	CAT_OCUP = 4

In turn, Table B presents a summary of the fields used to calculate the dimensions analyzed in Section 4.7 of the paper, identifying the different groups generated for each variable.

Table A2.B: Dimensions of informality in each occupational category.

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VARIABLE	DISAGGREGATION INTO GROUPS	EPH FIELD
GENDER	Men	CH04 = 1
	Women	CH04 = 2
AGE	< 18	CH06 < 18
	≥ 18 & < 30	18 >= CH06 <30
	≥ 30 & < 50	30 >= CH06 <50

	≥ 50	CH06 > 50
FORMAL EDUCATION	Incomplete secondary education	NIVEL_ED = 1 + 2 + 3 + 7
	Complete secondary education	NIVEL_ED = 4
	Incomplete higher education	NIVEL_ED = 5
	Complete higher education	NIVEL_ED = 6
MARITAL STATUS	Cohabitant and married	CH07 = (1 + 2)
	Separated, widowed, and single	CH07 = (3 + 4 + 5)
PLACE OF BIRTH	Argentina	CH15 = (1 + 2 + 3)
	Another country	CH15 = (4 + 5 + 6)
NUMBER OF WORKERS	1 to 5 workers	PP04C = (1 + 2 + 3 + 4 + 5)
	6 to 40 workers	PP04C = (6 + 7 + 8)
	More than 40 workers	PP04C99 = (9 + 10 + 11 + 12)
ECONOMIC SECTOR	Industry	PP04B_COD = (1000 a 3300)
	Building	PP04B_COD = (4000)
	Commerce	PP04B_COD = (4801 a 4811)
	Accommodation and food services	PP04B_COD = (5500 a 5602)

Appendix 3: Deseasonalization process and considerations related to the Hodrick and Prescott (HP) filter

- **Deseasonalization process**

The United States Census Bureau's X13ARIMA-SEATS software is used. The program, which is free to use, is capable of generating seasonal adjustments based on ARIMA (Autoregressive Integrated Moving Average) models using a version of the SEATS[20] software, originally developed by Víctor Gómez and Agustín Maravall at the Bank of Spain in the 1980s, as well as nonparametric adjustments using the X-11[21] procedure. This program is internalized through the R-Studio interface, using the "seasonal" library created by Christoph Sax and Dirk Eddelbuettel. This library provides access to both the decomposition method associated with the X-11 kernel and the method provided by SEATS. In both cases, different additive (NIV) and multiplicative (LOG) models are tested. By means of an iterative sweep, the best fit is selected in terms of parsimony and lower volatility of the data obtained (comparing the variance of the rates of change of the filtered series).

- **HP filter to calculate the trend and consider the reference cycle**

Uribe & Schmitt-Grohé (2017) and Kydland & Prescott (1990), among others, propose to extract the trend component of each series using the Hodrick-Prescott (HP) filter. This filter identifies the cyclical component y_t^c and the trend component y_t^s of a given series, for t=1, 2, …, T, as the solution to the following minimization problem:

$$\min_{\{y_t^c, y_t^s\}_{t=1}^{T}} \{\sum_{t=1}^{T} (y_t^c)^2 + \lambda \sum_{t=2}^{T-1} [(y_{t+1}^s - y_t^s) - (y_t^s - y_{t-1}^s)]^2\} \quad (1)$$

subject to

$$y_t = y_t^c + y_t^s \,. \quad (2)$$

According to this formula, the HP trend is the result of a trade-off between minimizing the variance of the cyclical component and keeping the trend growth rate constant. This trade-off is determined by the parameter λ, known as the smoothing parameter. The larger λ, the more the changes in the trend growth rate are penalized. In the limit, as λ tends to infinity, the trend component associated with the HP filter

[20] SEATS stands for Signal Extraction in ARIMA Time Series. It is a parametric method designed to seasonally adjust and decompose time series using ARIMA (Autoregressive Integrated Moving Average) models. As with traditional methods, it enables the decomposition of a series into the following components: trend-cycle (long-term component and business cycle), seasonality (recurrent periodic fluctuations), and irregular residual (nonsystematic component, noise, or random fluctuations).

[21] It has been the dominant method for decades. It is based on a sequence of iterative moving filters that decompose the series into trend cycle, seasonal component, and irregular component. Its strength lies in its robustness to adjust for seasonality in data series without the need to impose strong assumptions on its structure (for details, see *U.S. Census Bureau, 2023, X-13ARIMA-SEATS Reference Manual*).

corresponds to the linear trend. At the other extreme, as λ tends to zero, all variation in the time series is attributed to the trend, and the cyclical component is zero.

It is worth mentioning that there is a wide range of filters that can be used to decompose the series and that the properties of the cycles may depend on the filter used to eliminate the trend. However, none of them is superior to the others, since they all have constraints(Canova, 1998). The HP filter is no exception, as it has also been subject to criticism (Mejía Reyes, Gutierrez Alva, & Farías Silva, 2006).

However, (Zubimendi, Rojas, & Zilio, 2009) argue that the HP filter has become the standard procedure for obtaining the cyclical and trend components and is widely accepted in the academic environment. (Ravn & Uhlig, 2001) point out that none of the undesirable properties of the HP filter are particularly compelling, and that it has withstood the test of time.

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Appendix 4: Graphs with the series of each occupational category disaggregated into formal and informal

Figure A4.A: Number of persons listed by occupational category. All agglomerates in the EPH. Series filtered by seasonality. Quarterly data: period 2004.Q1-2024.Q4.

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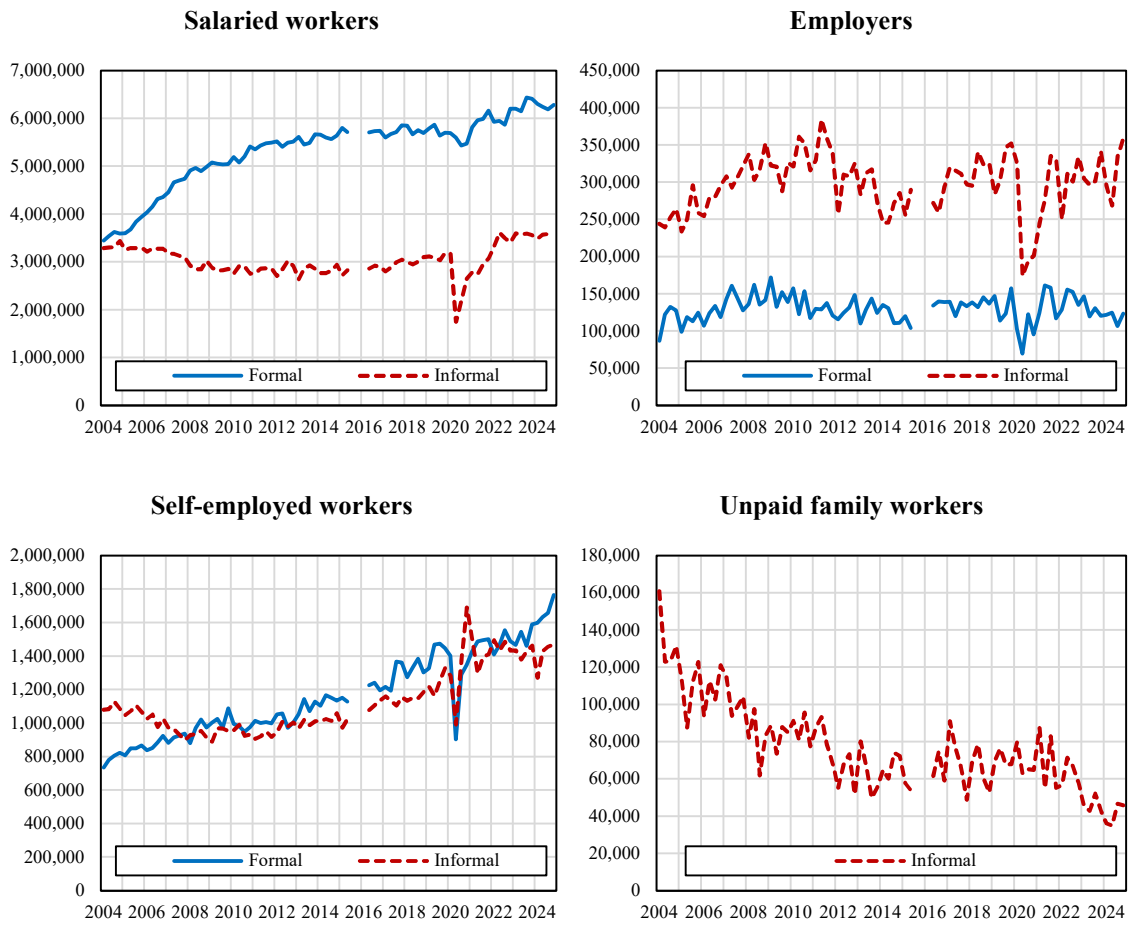

Source: Authors' own elaboration based on data from the Permanent Household Survey, INDEC.