A Job Vacancy Rate for Argentina

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1 Introduction

The number of vacancies or the vacancy rate is a key leading indicator of the state of the labor market. While vacancies in OECD countries have been extensively documented (Barnichon, 2010; Hobijn & Şahin, 2013), in developing countries, especially in Latin America, statistics on the number of vacancies are relatively scarce, discontinued or unrepresentative, which makes difficult the study of the dynamics of labor demand.

In this paper, we use a new dataset from a survey conducted by the Argentine Ministry of Production and Labor on a wide range of business establishments located in the largest Argentine metropolitan areas. The Survey of Labor Indicators (*Encuesta de Indicadores Laborales* – EIL) collects vacancy postings since 2008 and provides several indicators that are useful for understanding the job creation process. Like the JOLTS in the US, EIL collects the number of uncovered vacancies and estimates the number of hirings and separations. It also documents the number of newly posted vacancies and vacancies that are expected to be posted by the employer by the end of the month.

We combine this new series with the Labor Demand Index (*Indice de Demanda Laboral* – IDL), a measure equivalent to the printed help-wanted advertising index in the US published by the Center for Research in Finance (CIF) at Torcuato Di Tella University. The IDL is available since 2000 but is no longer published since 2014. Furthermore, it only considers printed advertisement and does not capture the increasing share of vacancies published online. We observe that IDL and EIL track each other relatively well during the 2008-2009 recession but deviate significantly thereafter.

Our two different measures of vacancy posting are combined in order to build a Beveridge curve for Gran Buenos Aires (GBA) using Barnichon (2010) methodology.[1] By doing so, we are able to analyze the cyclical relationship between job vacancies and unemployment for a period that includes six recessions and a large crisis. We observe, first, a clear inward shift of the Beveridge curve between 2004 and 2008. Additionally, it is shown that vacancies are highly volatile, negatively correlated with unemployment and strongly skewed to the left.

Our paper contributes to the literature in at least two major aspects. First, we construct a time series that can be used as an empirical background to calibrate and estimate theoretical models of the labor market in emerging countries. Second, the series provided here is an important input for policy, considering that job vacancies are a central component of the dynamics of the labor market.

[1] Throughout the paper, we will refer to the vacancy series constructed as the vacancies in Argentina, both for simplicity and because Gran Buenos Aires represents more than 70% of EIL's total employment.

The remainder of the paper is organized as follows. Sections 2 and 3 describe the data and the techniques applied to build a unique monthly series of the vacancy rate for Argentina from January 2000 through February 2019. The Beveridge curve is reported and discussed in Section 4. Section 5 concludes.

2 Data

2.1 The Survey of Labor Indicators (EIL)

The Argentine Ministry of Production and Labor, through the EIL, collects monthly data on firm job openings since 2008.[2] The survey gathers information from non-farm, non-mining formal firms with at least five employees registered in the Social Security System (*Sistema Integrado Previsional Argentino* – SIPA), located in the twelve largest metropolitan areas of Argentina, which represents 67% of the formal employment.[3] Data are available from January 2008 through February 2019. Firms with 5 to 100 employees stay in the sample for 13 months while those with more than 100 employees stay 19 months.[4]

The survey identifies two types of vacancies: [1] *Unfilled vacancies* and [2] *Newly opened vacancies and vacancies to be posted*. The first series shares a similar pattern compared to the job openings published by the BLS.[5] The major difference lies in the period of reference. Unfilled vacancies are opened positions that remain unfilled at the end of the previous month. Newly opened vacancies and vacancies to be posted refer to the number of new vacancies opened between the beginning of the current month and the survey's last day plus the number of vacancies that they are about to open by the end of the month. Finally, firms in EIL's sample are also asked to declare the number of workers at the beginning and at the end of the month as well as the number of hirings and separations during that period.

Panel A of Figure 1 shows that the average number of unfilled vacancies is about 5,000 per month. Given a total payroll of two million employed workers among surveyed firms, the vacancy rate is about 0.25% on average. Newly opened and expected vacancies sum up to 25,000 jobs per month on average, which represents approximately 1.25% of employment (see panel B). The former's average rate is remarkably low compared to the hiring rate, which ranges between 2% and 4%. Several reasons may explain the gap between the stocks of vacancies and the flow of matches. First, it may reflect temporal aggregation issues; a potentially large fraction of vacancies are filled before being

[2] See the survey's website at `http://www.trabajo.gob.ar/estadisticas/eil/index.asp`.

[3] A firm is considered formal if it is registered in SIPA and for which the government collects taxes.

[4] Except for Gran Buenos Aires, where the cut-off is 200 employees instead of 100.

[5] See `https://www.bls.gov/jlt/` for a technical note.

registered as unfilled vacancies. Second, firms may omit to declare vacancies they have or they expect to post. The two measures for the vacancy rate track each other relatively well. As it is common, Argentine recessions are marked by a sharp decline in the vacancy rate.

Panel B shows that the separation rate and the hiring rate are both procyclical and move together very closely. Mean values are roughly similar to those found in the US labor market from the JOLTS. Albeit the sample is not very long, the two series seem to become less volatile and to decline over time.

2.2 The Labor Demand Index (IDL) and a Comparison with EIL

Torcuato Di Tella University's IDL is comparable in its methodology to the print Help-Wanted Index (HWI) produced by the Conference Board in the US. It records the number of jobs advertised in the main national newspapers on a monthly basis between 2000 and 2014. Data are available for different Argentine metropolitan areas. Like the US print HWI, this indicator does not record online applications; thereby, missing the increasing share of online vacancy postings.

Figure 2 shows how the measures of vacancy posting by the IDL and the EIL behave between 2008 and 2014. In the aftermath of the 2008-2009 recession, the IDL series slightly rebounds and then decreases to levels even lower than those of the 2001 crisis. The EIL, in contrast, features a larger labor demand recovery after the recession.

The gap between EIL and IDL is very similar indeed to the one documented by Barnichon (2010) between the series by JOLTS and the print HWI in the US, but ten years later. The author interprets "the downward trend in the print HWI over 1995-2009 as a secular decline in print advertising due to the emergence of online advertising and the world wide web". Barnichon (2010) estimates the diffusion of online job advertising using data from the World Development Indicators related to the share of individuals using internet in the US population. He considers that the number of online job advertising depends directly on the fraction of internet users.

Panel B of Figure 2 shows this statistic both in the US and in Argentina. The sharp rise of internet usage in Argentina appears about ten years later than that of the US. The share increases substantially since 2009 and almost catches up the US value in 2016. This corresponds to the period for which the EIL deviates from the IDL, thereby supporting Barnichon's view regarding the link between internet usage and the decline in print advertising.

3 Building a composite vacancy rate

As noticed above, the trend of the print HWI for Argentina was affected by the diffusion of the internet in a similar way as for the US. Barnichon (2010) provided a methodology to solve this issue for the US by using the vacancy posting series published by the JOLTS. We adapt such methodology to build a composite vacancy rate using EIL data. Alvarez & Hofstetter (2014) applied a similar procedure by using the print and online HWIs for Colombia. However, they used the parameters of internet diffusion in the US to scale their print HWI share. We argue that this method is not accurate in the case of Argentina due to the observed differences in the shape of internet diffusion between this country and the US (see Figure 2).

Argentina's IDL has not been upgraded with the online job posting series. To solve this issue, we assumed that the EIL series is a good proxy for the index of total job postings (H_t) in Argentina. As in Barnichon (2010), we consider that the IDL ($P_t^{\#}$) is a share (s_t) of the total number of vacancies posted ($H_t^{\#}$):

$$P_t^{\#} = s_t H_t^{\#}, \tag{1}$$

where the variation of the share of IDL is given by:

$$dln(s_t) = dln(P_t) - dln(H_t). \tag{2}$$

Argentina's print share seems to display a sigmoid trend like in the US case. Therefore, we estimate this trend using a diffusion, Mixed Information Source Model (MISM) as in Barnichon (2010). This function is widely used in the marketing literature and performs well to estimate the Argentine internet diffusion process as shown by Figure 2.

Next, we suppose that the internet diffusion for vacancy postings started in 2000. This is not a strong assumption if we take a look at the Argentina's and the US' internet diffusion processes. Barnichon (2010) assumes that the internet diffusion starts in 1995, with an internet share in the US at nearly 10% compared to 8% in Argentina by the year 2000.

Finally, we need to infer Argentina's online share of vacancy postings for January 2008 (the starting date of EIL's sample), in order to estimate the MISM function. Since the IDL seems to be highly affected by the 2001 crisis, an estimate for the trend of the print share based only on the sample from 2000 to 2008 would not be a good approximation. To tackle this issue, we extended the use of the IDL to February 2014. We use a high value of smoothing parameter (10^7) to be consistent with the one used by Barnichon (2010) and Shimer (2005) for the US. We take the value of the printed share 2008 as a starting point for the MISM estimation over the period 2008-2014, and then we extrapolate for the period 2000-2007. The s-curve estimated is given by figure 3. As the total of

vacancy is given by $H_t^{\#} = P_t^{\#}/s_t$ we can now calculate the rescaled IDL index. Figure 4 displays our results.

In table 1, we calculate the moments for the main Argentine labor market series. The vacancy rate seems to be slightly more volatile than the unemployment rate (0.25 versus 0.17). The negative correlation between both variables' percent deviations from the trend is relatively high (-0.81) and comparable to the one calculated by Shimer (2005) for the US. The composite HWI that we propose is highly skewed to the left of the distribution (-1.39), while the unemployment rate is skewed to the right (-0.66), close to the value found by Ferraro (2018) for the US. Finally, both series seem to display a high persistence at a monthly frequency, with an autocorrelation close to 0.99.

4 Beveridge curve analysis

The Beveridge curve is a widely used chart for analyzing the mismatch between jobs and applicants in the labor market. Now we use our vacancy series to examine this relationship in the case of Argentina. For comparison purposes, we divide the number of vacancies by the total labor force using data from the Argentine Household Survey (Encuesta Permanente de Hogares – EPH) published by the National Institute of Statistics and Censuses (INDEC).[6] Since the labor force from EPH is available at a quarterly frequency, we apply a cubic spline interpolation in order to keep the monthly frequency.[7] Finally, as the cubic spline violates the non-autocorrelation hypothesis for OLS estimation, we use Newey-West standard errors to check the significance of the estimated Beveridge curve.

Figure 5 displays the Beveridge curve. In panel A, we observe a clear inward shift of the curve that occurs between 2004 and 2008. This shift must be linked to the important changes observed in the flows of workers in Argentina's labor market. As documented by Albertini et al. (2019), this period was characterized by a strong decline in the inflows from formal employment, non-employment, and informal employment. In addition, we observe a large and permanent increase in unemployment outflows to employment. The shifting behavior of the Beveridge curve may then reflects changes in separations from employment to unemployment, lower labor market entries and/or an increase in matching efficiency. A proper assessment of their respective contribution should undertake rigorous identification strategies. While this is an interesting topic for future research it remains beyond the scope of this paper.

[6] Elsby et al. (2015) defines the vacancy rate as $V_t/(V_t + N_t)$, while Barnichon (2010) considers V_t/LF_t, with V_t the total number of vacancies, LF_t the labor force and N_t the number of workers. We consider the last definition.

[7] Albertini et al. (2019) show that the transition rate in Argentina's labor market is relatively low. Then, such a transformation seems to be a good approximation.

5 Conclusion

This paper provides a time series for vacancies in Argentina using a novel establishment survey's dataset and a (discontinued) print help-wanted index. We show that unemployment and vacancies display a Beveridge curve, even in an economy with high levels of informality. The series can then be used to study the various relevant issues that characterize labor markets in emerging countries and help in any policy design.

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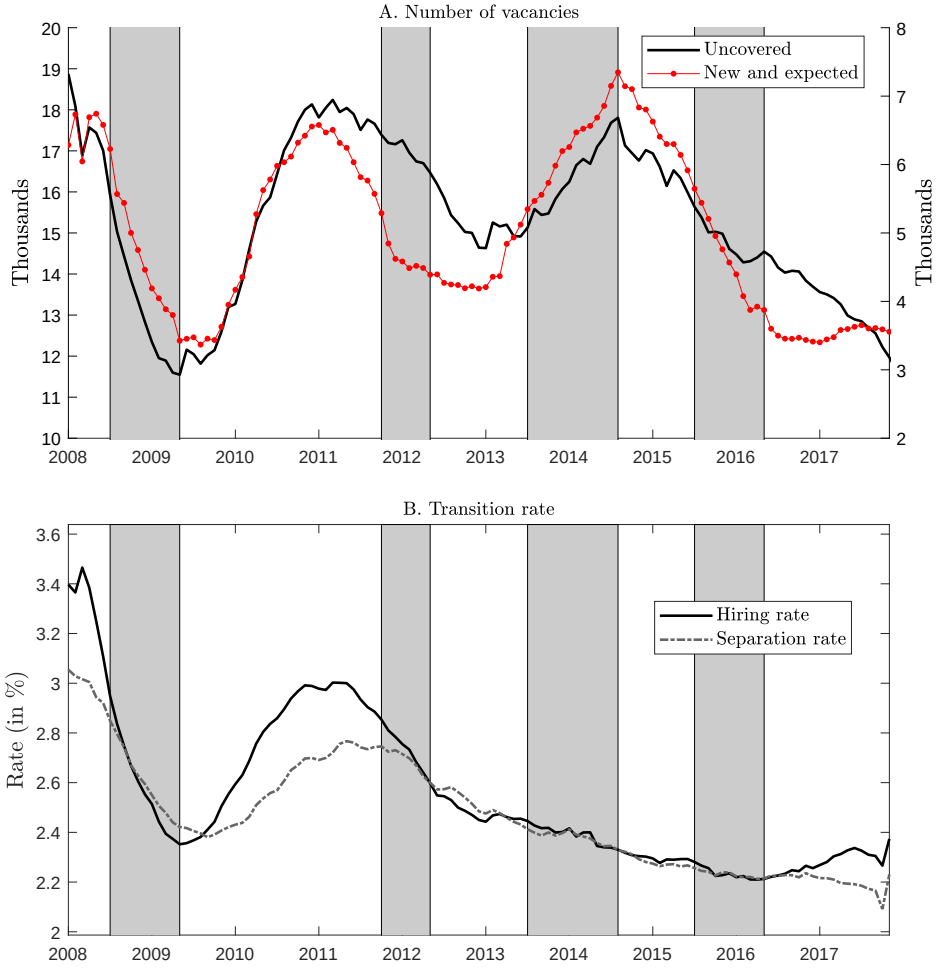
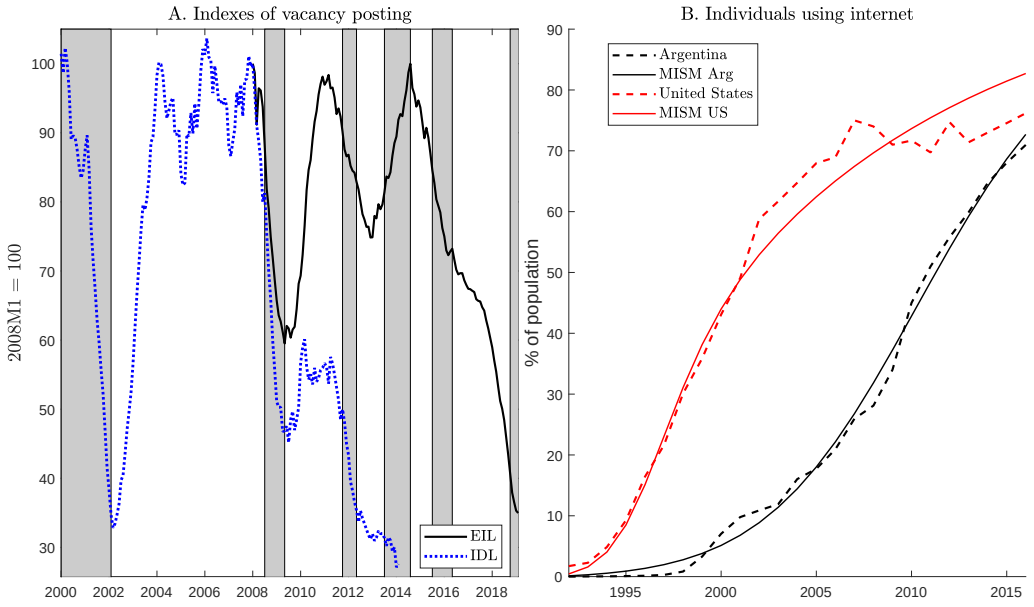
Figure 1: Time series from EIL



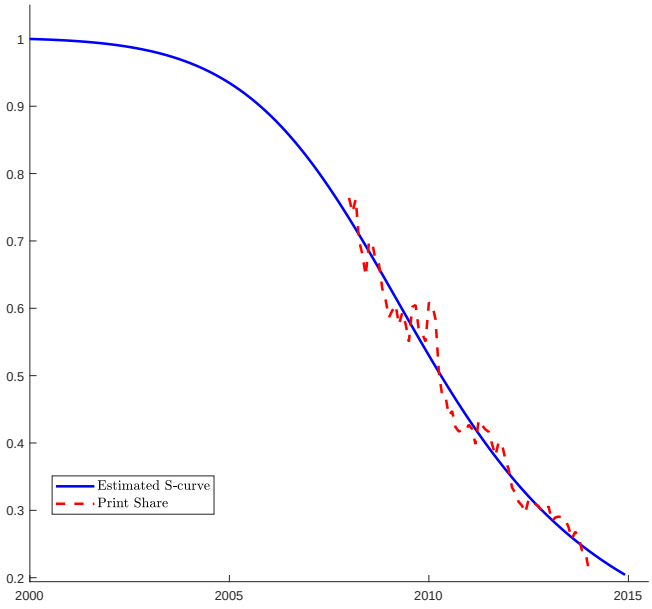
Note: Gray shaded areas are Argentina Recessions. The hiring rate and the separation rate are equal to total hirings and total separations divided by the employment at the beginning of the reference month respectively.

Figure 2: Indexes of vacancy posting and Internet diffusion



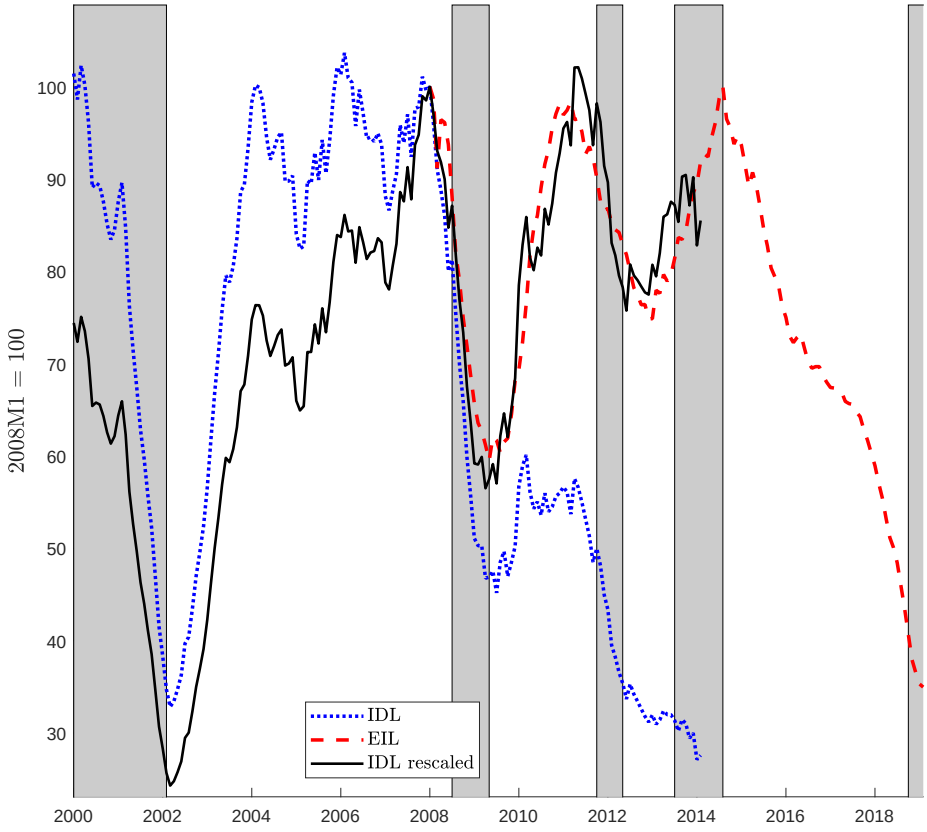
Note: Gray shaded areas are Argentina Recessions. EIL corresponds to the vacancy rate (uncovered + new and expected vacancies) scaled as of base 100.

Figure 3: Share of print advertising over 2000-2015



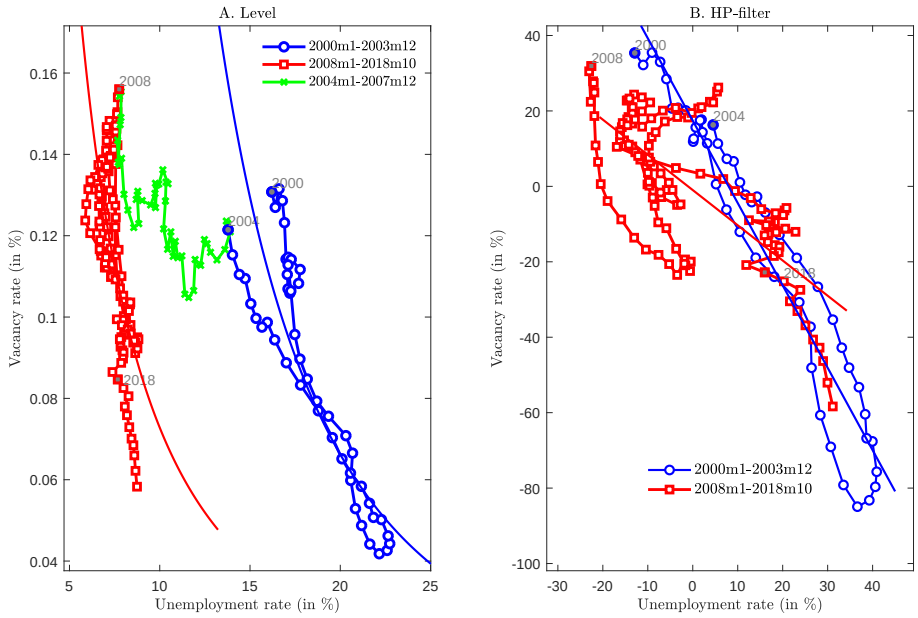
Note: As a share of the Argentine households.

Figure 4: Indexes of vacancy posting and rescaled IDL



Note: Gray shaded areas are Argentina Recessions. Indexes scaled as of base 100 for January 2008

Figure 5: Beveridge Curves



Note: In panel B, the series are in logs and passed through an HP-filter with smoothing parameter 10^7.

	2000-2007	2008-2018	2000-2018
σ_u	0.1871	0.1462	0.1661
σ_v	0.3076	0.1873	0.2455
σ_θ	0.4815	0.3104	0.3930
corr(u,v)	-0.8879	-0.7288	-0.8168
AC u	0.9945	0.9888	0.9920
AC v	0.9876	0.9899	0.9882
AC θ	0.9920	0.9924	0.9921
Skewness u	0.5151	0.6534	0.6662
Skewness v	-1.3935	-0.6735	-1.3878
Skewness θ	-0.7664	-1.1577	-1.2230

Table 1: LABOR MARKET STATISTICS. *Monthly data; variables unemployment rate (u), vacancy rate (v) and Labor market tightness ($\theta = v/u$) are reported in log deviations from an HP-trend with smoothing parameter* 10^7.

DATA SETS	SOURCES	VARIABLES	CHARACTERISTICS
Labor Indicators Survey *Encuesta de Indicadores Laborales (EIL)*	Argentine Ministry of Production and Labor	(a) Uncovered vacancies (b) New and expected vacancies (c) Beginning of period employment (d) End of period employment (e) Total hirings (f) Total separations	Monthly, not s.a.[1] 2008 M1 - 2019 M2
Labor Demand Index *Indice de Demanda Laboral (IDL)*	Center for Research in Finance (CIF) Torcuato Di Tella University	Measure of printed Help-wanted index	Monthly, s.a., Base 100 Gran Buenos Aires, Gran Rosario, Mendoza, 2000M1 - 2014M11[2] Source
Argentine Household Survey *Encuesta Permanente de Hogares (EPH)*	Instituto Nacional de Estadística y Censos (INDEC)	Unemployment rate	Quarterly / Semiannual Source
World Development Indicators ICT Development Report and database.	The World Bank	Individuals using the Internet in % of population	Annual, 1992 - 2016 Source

Table 2: Data sets summary

[1] We use the X12 ARIMA process to get the seasonally adjusted series and 19 points moving average. [2] 2000M1 - 2014M1 for Gran Buenos Aires IDL index