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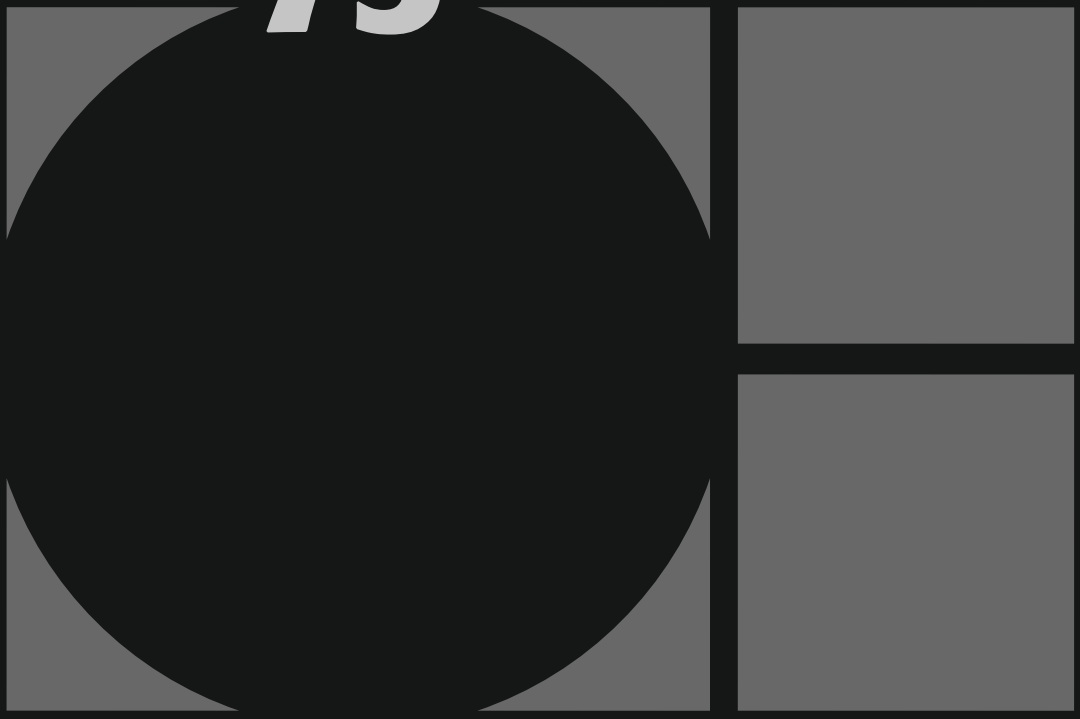

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ARTÍCULO

HIGH-GROWTH FIRMS IN PERU

Alex Coad
Gregory Scott

Coad, A., & Scott, G. (2018). High-growth firms in Peru. *Cuadernos de Economía*, *37*(75), 671-696.

This exploratory research note investigates the frequency and activity of High-Growth Firms (HGFs) in Peru using panel data on Peru's largest firms for the years 2001-2016. Firms in our dataset enjoyed strong growth in revenues during the period. Compared to other countries, HGFs are relatively common in Peru although the share they represent of all firms in the database decreased over the time span of our analysis. We confirm several previous findings, such as the heavy-tailed growth rates distribution, and the superior growth performance of small and young firms.

Keywords: High-Growth Firms, Firm Growth, Peru, Gibrat's Law.
JEL: L20, L25.

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Coad, A., & Scott, G. (2018). Empresas de alto crecimiento en Perú. *Cuadernos de Economía*, 37(75), 671-696.

Este artículo examina la frecuencia y actividad de las empresas de alto crecimiento en Perú, empleando datos de panel sobre las empresas más grandes de Perú entre los años 2001 y 2016. Las empresas de nuestro conjunto de datos gozaron de un fuerte crecimiento en sus ingresos durante dicho periodo. En comparación con otros países, las empresas de alto crecimiento son relativamente comunes en Perú, aunque la proporción que representan del total de empresas incluidas en la base de datos disminuyó con el paso del tiempo en el periodo analizado. Confirmamos varios hallazgos previos, como la distribución de cola pesada de las tasas de crecimiento, y el desempeño superior de crecimiento de las empresas pequeñas y jóvenes.

Palabras clave: Empresas de alto crecimiento, crecimiento empresarial, Perú, Ley de Gibrat.
JEL: L20, L25.

Coad, A., & Scott, G. (2018). Entreprises à forte croissance au Pérou. *Cuadernos de Economía*, 37(75), 671-696.

Cet article examine la fréquence et l'activité des entreprises à forte croissance au Pérou, en utilisant des données de panel sur les entreprises les plus grandes de ce pays entre les années 2001 et 2016. Les entreprises de notre ensemble de données ont connu une forte croissance de leurs revenus au cours de cette période. Comparativement à d'autres pays, les entreprises à forte croissance sont relativement communes au Pérou bien que la proportion qu'elles représentent par rapport au total des entreprises inclues dans la base de données ait diminué au cours de la période analysée. Nous confirmons plusieurs découvertes antérieures, comme la distribution de queue lourde des taux de croissance, et une croissance plus dynamique des petites et jeunes entreprises.

Mots-clés: entreprises à forte croissance, croissance entrepreneuriale, Pérou, Loi de Gibrat.
JEL: L20, L25.

Coad, A., & Scott, G. (2018). Empresas de alto crescimento no Peru. *Cuadernos de Economía*, 37(75), 671-696.

Este artigo examina a frequência e a atividade das empresas de alto crescimento no Peru, usando dados em painel sobre as principais empresas no Peru entre 2001 e 2016. As empresas em nosso conjunto de dados tiveram um forte crescimento em suas receitas durante esse período. As empresas em nosso conjunto de dados tiveram um forte crescimento em suas receitas durante esse período. Em comparação com outros países, as empresas de alto crescimento são relativamente comuns no Peru, embora a proporção que elas representam do número total de empresas incluídas no banco de dados tenha diminuído ao longo do tempo no período analisado. Confirmamos várias descobertas anteriores, como a distribuição de cauda pesada das taxas de crescimento e o desempenho de crescimento superior de empresas pequenas e jovens.

Palavras-chave: empresas de alto crescimento, crescimento empresarial, Peru, Lei de Gibrat.
JEL: L20, L25.

INTRODUCTION

Entrepreneurship has long been recognized as a key driver of innovation and economic development (Schumpeter, 1934; Audretsch, 2012). Renewed interest in an understanding of micro-macro linkages between firm-level activities and their collective impact at the national level have taken on heightened importance of late in part because of the global recession of 2008-2009 that affected both industrial and developing countries alike, with devastating effects on income, employment, and growth. In that context, academics and policymakers have become increasingly aware that it is not the quantity of firms that matters for economic performance, but the quality of these firms (Henrekson & Sanandaji, 2014; Acs, Åstebro, Audretsch, & Robinson, 2016; Lederman, Messina, Pienknagura, & Rigolinia, 2014). In particular, as noted earlier, a small number of firms can account for a disproportionately large share of job creation (Birch, 1979). And, as has been seen with the advent of the internet, a few of such enterprises can also contribute to the emergence of new sectors (Bos & Stam, 2014; OECD, 2015) and provide jobs for individuals who might otherwise be marginalized on the labour market (Coad, Daunfeldt, Johansson, & Wennberg, 2014a). This coincidence of circumstances and events has led to growing interest in High-Growth Firms (HGFs) (Delmar, Davidsson, & Gartner, 2003; Henrekson, & Johansson, 2010; Coad, Daunfeldt, Hölzl, Johansson, & Nightingale, 2014; Bianchini, Bottazzi, & Tamagni 2017; Demir, Wennberg, & McKelvie, 2017). In particular, international organizations such as the European Commission and the OECD are increasingly interested in macroeconomic indicators, at the national level, regarding the frequencies of high-growth firms (Eurostat-OECD, 2007; European Commission, 2014). However, most of the research and discussion on HGFs has been focused on industrialized countries, e.g. (Henrekson & Johansson, 2010; OECD, 2011; Coad et al., 2014b) even as developing countries increasingly recognize the importance of the issues associated with such enterprises (Navarro, Benavente, & Crespi, 2016; OECD, 2016, McKenzie, 2017).

In light of these various considerations, this exploratory research note contributes to the literature by presenting novel findings on HGFs in Peru. Given its recovery from macroeconomic instability in the 1970s, 1980s, and 1990s (Tello & Tavara, 2010), as well as the challenges inherent in a dichotomous business sector much of which remains mired in informality (Schneider, Buehn, & Montenegro, 2010; Machado, 2014), Peru constitutes an interesting case for entrepreneurship research. More specifically, a series of recent studies of entrepreneurship, innovation, and growth in company sales in Peru – many of which were focused on a particular point in time – reaffirm the appropriateness of a firm-level analysis over a more sustained period (Chaston & Scott, 2012; Scott & Chaston, 2012, 2013, 2014). In a similar vein, other recent research that focused on the evolution of firms in particular sectors points to the usefulness of a broader approach aimed at understanding the performance of firms across the entire economy (Llosa & Panizza, 2015; Tello, 2017). Furthermore, based on available data for other countries and Peru´s recent record of rapid economic growth (World Bank, 2017), prelimi-

nary findings suggest that Peru may well have had a relatively high share of HGFs in recent years. This study then seeks to explore the incidence, duration and characterization of HGFs in Peru during the period 2001-2016 both to inform private sector participants regarding recent firm performance and to provide added empirical evidence to the on-going policy debate related to innovation and entrepreneurship (OECD, 2016).

This paper is organized as follows: Section 2 contains a brief overview of the Peruvian economy during previous decades so as to better contextualize the current analysis. Section 3 presents the data utilized for this study followed by the analysis in Section 4. Section 5 provides some concluding remarks and identifies a number of emerging issues for future research.

BACKGROUND ON THE PERUVIAN ECONOMY

Recent estimates indicate the GDP of Peru was 403 billion in PPP Intl$ (international dollars), and its GDP per capita was Intl$ 12,639[1], below that of its neighbours Chile (24,170), Brazil (15,941), and Colombia (14,164), but above that of its neighbours Ecuador (11,839) and Bolivia (6,530). Peru is currently preparing to join the OECD (Organization of Economic Co-operation and Development) (CGBS, 2016), perhaps as early as 2021.[2] Peru´s current economic indicators belie the outcome of a tumultuous and violent journey through economic, political, and social turmoil during the 1970s, 1980s, and early 1990s characterized by four drastically different governments in succession that had a major impact on firm survival, let alone the potential for firm growth. A brief review of these past developments is intended to put our analysis of firm performance in the more recent period under review in proper context and, thereby, to facilitate a more grounded interpretation of associated statistical analysis.

A leftist military regime throughout the 1970s sought to give the State control over economic activities by confiscating foreign and domestic companies alike (Dancourt, Mendoza, & Vilcapoma, 1997; Flores & Ickis, 2007) while drastically curtailing civil liberties (e.g., freedom of speech, freedom of the press) in the process (Quiroz, 2008). By the late 1970s, sharply deteriorating real incomes due to economic mismanagement, graft, and corruption forced a return to civilian rule in 1980 (Skidmore & Smith, 1997).

From 1980-1985, the democratically elected government fostered a policy of import substitution that favoured certain firms and sectors for domestic capitalist development while maintaining State enterprises and encouraging foreign direct

[1] PPP in millions, according to IMF estimates in the April 2015 World Economic Outlook database. See https://en.wikipedia.org/wiki/List_of_Latin_American_and_Caribbean_countries_by_GDP_(PPP).

[2] See http://www.andina.com.pe/ingles/noticia-oecd-peru-likely-to-join-group-of-developed-countries-by-2021-603267.aspx

investment in others e.g., mining (Kasturi, Barton, & Reficco, 2012). High interest rates on an inherited foreign debt, the El Niño natural disaster of 1983, and a public sector without a significant tax base all contributed to an inflation rate of 150% a year in 1985, and a sharp drop in per capita incomes and also the prospects for firm growth based on domestic demand in the process (Dancourt, Mendoza, & Vilcapoma, 1997). Adding to the already challenging convergence of circumstances, terrorism became emboldened through funding based on a major expansion in coca cultivation tied to production and shipment of illegal drugs (Gonzales de Olarte, 1991) and the absence of a coherent government strategy to suppress it (Murakami, 2007).

In 1985, Alan Garcia's newly elected government gained international attention by embracing economic heterodoxy – promising to reassert the role of the State in economic activity, e.g. by controlling prices for basic food commodities, only paying 10% of export earnings towards the foreign debt, and covering the subsequent fiscal deficit by printing money (Pastor & Wise, 1992; Rossini & Santos, 2015). The resulting hyperinflation reached over 7000% a year by 1990 driving many firms into bankruptcy as terrorist activity became much more widespread, eventually leading to nearly 70,000 civilian casualties (Loayza, 2008; World Bank 2017).

With the nation on the verge of bankruptcy and isolated from international capital markets, the Fujimori government embraced a greatly reduced role of the government in economic affairs and instead opted for a policy of globalization—aggressively seeking free trade agreements with various countries, privatization of State enterprises as a way of attracting much needed foreign direct investment, liberalization, i.e. the elimination of price controls on basic household commodities (e.g., food, fuel), and a freely floating exchange rate (Pasco-Font & Saavedra, 2001; Llosa and Panniza, 2015; Rossini & Santos, 2015). The counter terrorism strategy was also revamped by focusing on the leadership instead of fighting the rank and file. By the mid-1990s, the success of these policies led to a stabilization of the economy and the capture of many of the leading terrorists. As the economy opened up to much greater foreign competition in the domestic market for the first time in decades, many long-established firms were bought out, forced into mergers, or consolidated into larger enterprises given the pressures on their financial viability (Shimuzu, 2004). But the recession of 1997-98, brought in part by the crisis in Asia and a recurrence of El Niño, gave way to a series of revelations regarding massive corruption in government involving many prominent private firms and the eventual end of the Fujimori government (Conaghan, 2005; Abusada & Cusato, 2007).

Entering the new millennium, the combination of higher world prices for minerals and metals and successive governments' consistent embrace of privatisation and market liberalisation paved the way for year after year of rapid economic growth (Hausmann & Kingler, 2008; Anon, 2009; González Vigil, 2009). So much so that in the midst of the 2009 global recession, Peru was one of only a handful of countries world-wide that registered positive economic growth despite the major down-

turn in most Western economies (IMD, 2010) thereby enabling it to emerge as one of the strongest economies in Latin America (Tello & Tavara, 2010).

Abundant mineral resources have supported strong export performance, and, in recent years, growth has spread to other sectors of the economy including tourism, agribusiness, and construction. Peru has also witnessed a revival of domestic demand with rising real incomes stimulating greater food production for the internal market (De Althaus, 2007; Scott, 2011; Loayza, 2008) and a boom in both residential and commercial construction. Tourism continues to flourish, generating billions in revenue and numerous new jobs in hotels, transportation and the restaurant industry.

The succession of positive economic developments enabled Peru to enjoy a growth rate of 5.8% or more for each year during 2010-2013, although since then it has slowed down slightly, with 2.4% in 2014, 3.3% in 2015, and 4.1% in 2016.[3] Nonetheless, Peruvian exports remain heavily dependent on mining and agricultural products (World Bank, 2017). Moreover, the structure of the economy continues to be characterized by a small number of conglomerates made up of family-owned and controlled large firms (Shimizu, 2004; Conaghan, 2005) that are complemented by the presence of multinational enterprises in certain sectors (e.g., mining, energy, telecommunications, and retail trade) and a large number of informal enterprises that account for an estimated 35% - 60% of GDP and employ some 60% of the economically active workforce (Machado, 2014).

DATA DESCRIPTION

According to government statistics (INEI, 2017), some 2.1 million legally registered firms currently operate in Peru (Table 1), with perhaps another 2.1 million more informal enterprises based on available estimates of their share of GDP (Schneider, Buehn, & Montenegro, 2010). Over 94% of all these companies are micro-businesses. In that context, we analyse the Peru Top 10,000 dataset, which collects the annual statistics on the largest legally constituted firms; they are grouped in successive waves and joined together into a panel. Previous work on this dataset includes Shimizu (2006), Alarco Tosoni (2011) and Tello (2017).

We use the most complete available dataset: "Base Completa VIP."[4] Our data focuses on the largest firms in Peru; thus, small, young firms are under-represented. Having said that, it should be also be noted that a "large" firm in this dataset might best be understood as including some firms that would indeed be considered large in terms of revenues or numbers of employees, but given published statistics on all legal firms in Peru, a collection of the largest 10,000 firms is perhaps best understood as made up of firms that are the largest compared to all the

[3] See http://www.ptp.pe/pdf/macroptpdic2015.pdf

[4] Data exported on 9th August 2017. Information on the data is available at the following link: http://www.toponlineapp.com/toponline/index.php?r=bases/completavip

others, (it is certain to include medium-firms and possibly even some small firms). Be that as it may, our use of this dataset implies a potential source of sample selection bias, for example if small firms, which may have higher growth rates (Sutton, 1997), are not included in our analysis. This focus on the largest firms should be kept in mind when interpreting our results.

Table 1.
Peru: Companies, by Business Segment, 2015-16

Business Segment	2015	2016		Var %
		Absolute	Percentage	2016/15
Total	**2 042 992**	**2 124 280**	**100**	**4.0**
Microbusiness	1 933 525	2 011 153	94.7	4.0
Small Business	89 993	92 789	4.4	3.1
Large and medium business	12 494	13 031	0.6	4.3
Public Administration	6 980	7 307	0.3	4.7

Source: Instituto Nacional de Estadística e Informática (2017).

The database includes information on revenues as well as other firm characteristics such as age and sector of activity.[5] The panel stretches from 1993 to 2017 although data on revenues is only available for the years 2000-2016.[6]

Firms are identified by their 'RUC' ('Registro Único de Contribuyentes') identifier code, which is a national code used by tax authorities for statistical records of economic activity. In the raw data, the same RUC code may appear more than once in a year, in cases where the contact details of different individuals from the same firm are listed. We therefore drop duplicates by keeping only the first occurrence of each group of duplicated observations for each RUC code in each year. Our data cleaning also involves dropping possible cases of negative revenues.

Firm growth is usually measured in terms of total sales or employment (Shepherd & Wiklund, 2009). The employment variable seems problematic in our dataset,[7] so we focus on revenues ('*Ingresos*') growth. The growth rate of revenues, for firm

[5] There are also some financial variables (such as 'patrimonio' (equity) and 'ROE' (return on equity)), although these variables may not be entirely reliable. For example, ROE is recorded with a value of zero in over 90% of cases (345,805 out of 376,852), which probably does not mean that ROE was actually zero for these firms: rather, ROE was missing.

[6] In some cases, variables are available for more recent years although these are projections rather than actual values. In our analysis, we focus only on observed values and not projections.

[7] The employment variable has many missing observations: many firms are recorded as having only 1 employee (which is unexpected in a sample of Peru's largest firms), and there is precisely zero variation in number of employees across the years in our sample. Given that we have no reliable variable for employment, we cannot construct an indicator for productivity in our dataset.

i in year *t*, is calculated by taking log-differences of annual revenues (Tornqvist, Vartia, & Vartia, 1985; Coad, 2009).

$$\text{Gr\_revenues}_{it} = \log(\text{revenues})_{it} - \log(\text{revenues})_{i,t-1}$$

Age is calculated with reference to the year of founding.[8] Cases of negative age, which are sometimes observed in the early years of the panel, are implicitly dropped from the analysis by taking the logarithm of age in the regressions. A variable 'estatal' provides information on whether a firm is a State-owned enterprise, but it does not distinguish between non-State-owned enterprises, and missing observations (the variable only takes the value 1 or missing; and we convert all missing observations to zeroes to create a dummy). Therefore, this variable for State-owned firms should be interpreted with caution.

Deflating the data

Our focus on revenue growth rather than employment growth requires that we deflate our data to address inflation. This is an important methodological step to avoid confounding inflation with genuine firm growth. This is especially important in the Peruvian context, because Peru suffered inflation of over 50% for every year between 1981 and 1992, with over 7000% inflation in 1990 (Loayza, 2008; Rossini & Santos, 2015). However, inflation has remained below 10% from 1996 onwards.

To control for inflation, ideally we would use accurate sector-specific deflators to account for possible differences across sectors – however, we did not find any such deflator. Therefore we use the GDP deflator (annual %) from the World Development Indicators of the World Bank national accounts data, and OECD National Accounts data files (indicator code: NY.GDP.DEFL.KD.ZG; downloaded from https://data.worldbank.org/indicator/NY.GDP.DEFL.KD.ZG , last updated 14th December 2017). To be precise, "Inflation as measured by the annual growth rate of the GDP implicit deflator shows the rate of price change in the economy as a whole. The GDP implicit deflator is the ratio of GDP in current local currency to GDP in constant local currency."[9]

ANALYSIS

Descriptives

Table 2 contains some summary statistics for our data. Figure 1 shows the firm size distribution, for different years. Firm size has been increasing over years, as the

[8] To be precise, the year of foundation was extracted from the information on day of foundation, and this is subtracted from the current year for each observation.

[9] See https://data.worldbank.org/indicator/NY.GDP.DEFL.KD.ZG

distribution shifts to the right. Since 2000, the distribution has a narrower support - there is a lower proportion of relatively smaller firms in our dataset in later years.

Table 2
Summary Statistics for Firms with Positive Revenues

Variable	mean	sd	p10	p25	p50	p75	p90	N
Revenues (millions)	87.94	550.72	4.18	8.39	15.56	40.96	129.22	91833
Growth of revenues	0.08	0.65	-0.30	-0.08	0.07	0.23	0.49	69489
No. of branches	3.31	18.93	1	1	1	1	2	91032
Age	19.46	18.26	4	8	14	24	44	91721
Importer dummy	0.45	0.50	0	0	0	1	1	91833
Exporter dummy	0.22	0.41	0	0	0	0	1	91833
State-owned	0.10	0.30	0	0	0	0	1	91833

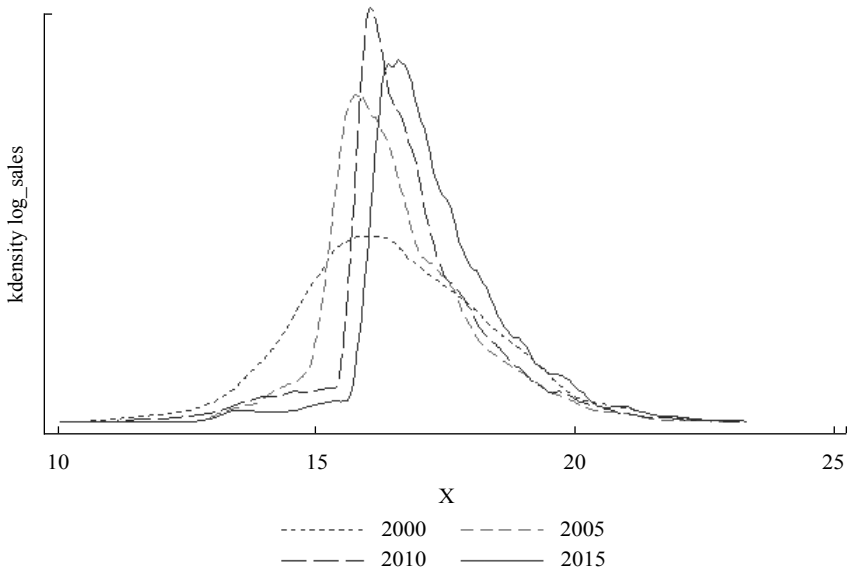
Source: Our calculations.

Figure 2 shows the growth rates distribution for firms in our sample. In contrast to previous work for other countries (e.g. Stanley et al., 1996 for the US; Bottazzi & Secchi, 2006 for Italy; Bottazzi, Coad, Jacoby & Secchi, 2011 for France), the growth rates distribution is not symmetric, but rapid growth is relatively common, and (especially in 2005) rapid decline is relatively rare. The large firms in our sample appear to be surging forward in terms of rapid revenues growth.

Figure 3 shows the evolution of the first four moments of the growth rate distribution throughout the years. As Peru pulled out of the 1990s crisis, one could have expected a period of high growth, and perhaps decreasing business volatility. Figure 3 complements Figure 2, and shows that the mean growth rate has usually been above zero, corresponding to positive revenues growth, and also that – apart from a few peaks – the standard deviation of growth rates seems to have remained fairly flat. The skewness errs on the positive side, which suggests that the growth rate distribution is asymmetric, with a larger weight at the right tail (i.e. there are more firms enjoying large positive growth rates than large negative ones).

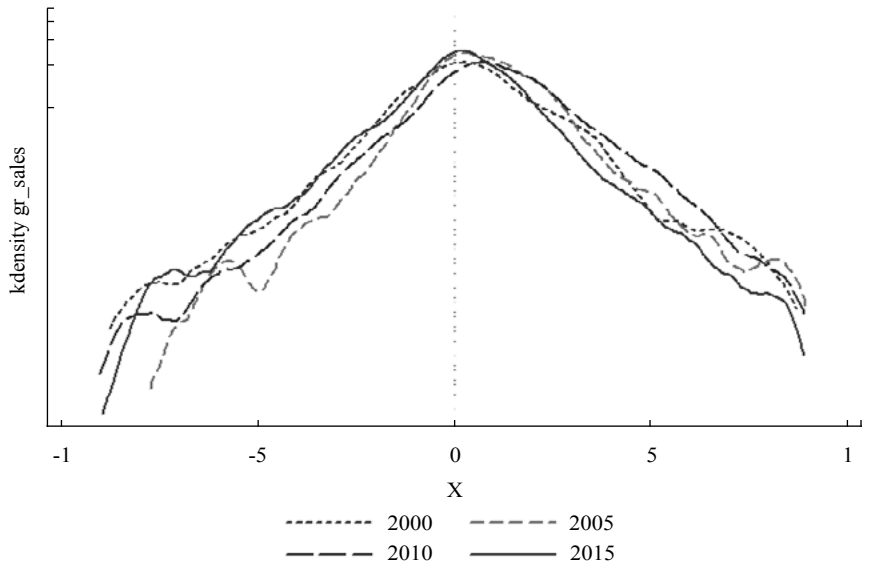
Figure 4 shows the bivariate density of growth rates in consecutive years, following Coad, Daunfeldt, & Halvarsson, (2018). The area that has the highest density (i.e. the area with the darkest shading) corresponds to mild-positive growth rates in t-1 and also t. However, all possible combinations of growth are observed (including the possibility of decline in two consecutive years, which would correspond to the bottom left quadrant).

Figure 1.
Firm Size Distribution (Where Size is Measured in Terms of log of Revenues), for Different Years.



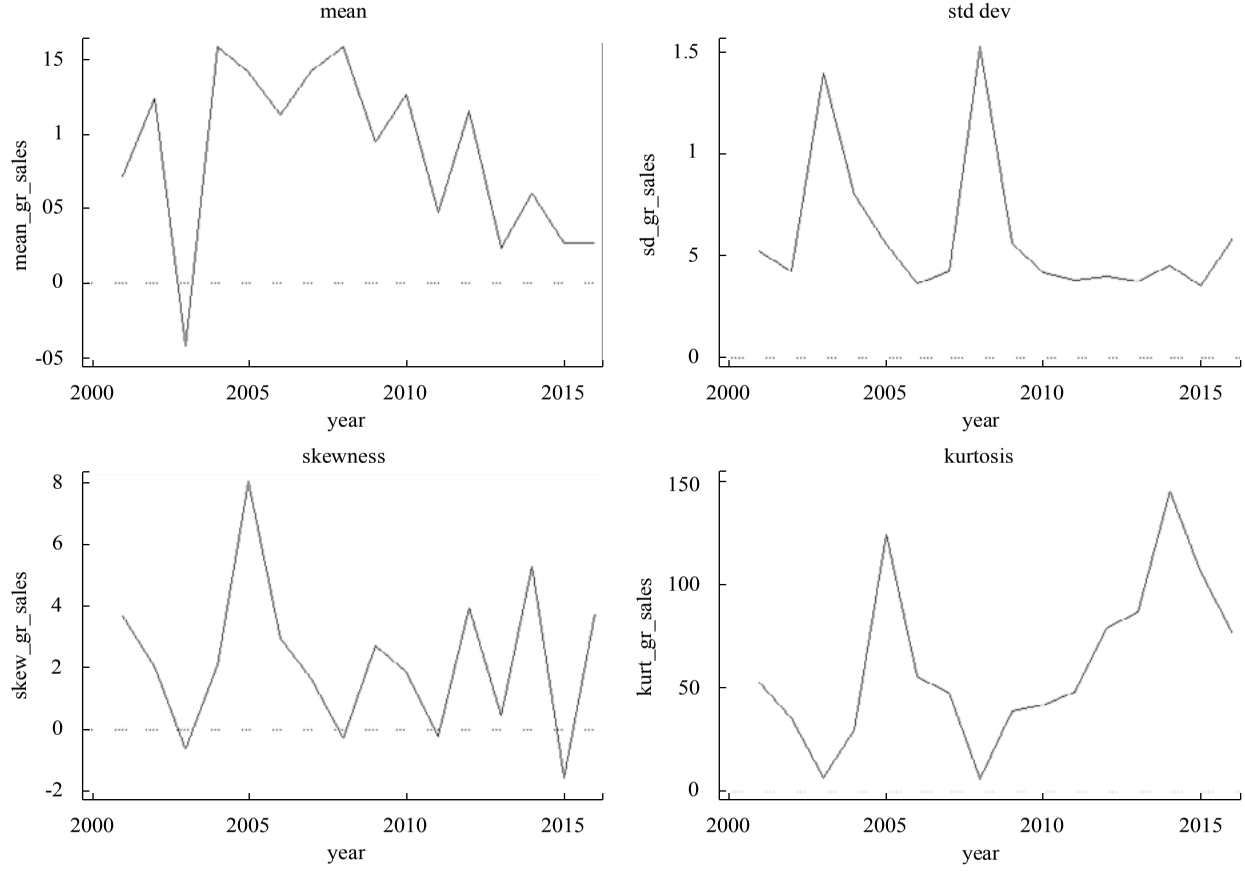
Source: Our calculations.

Figure 2.
Growth Rates Distribution for Our Dataset, for Different Years. Note the log scale on the y-axis. The dotted line is at growth=0.0000.



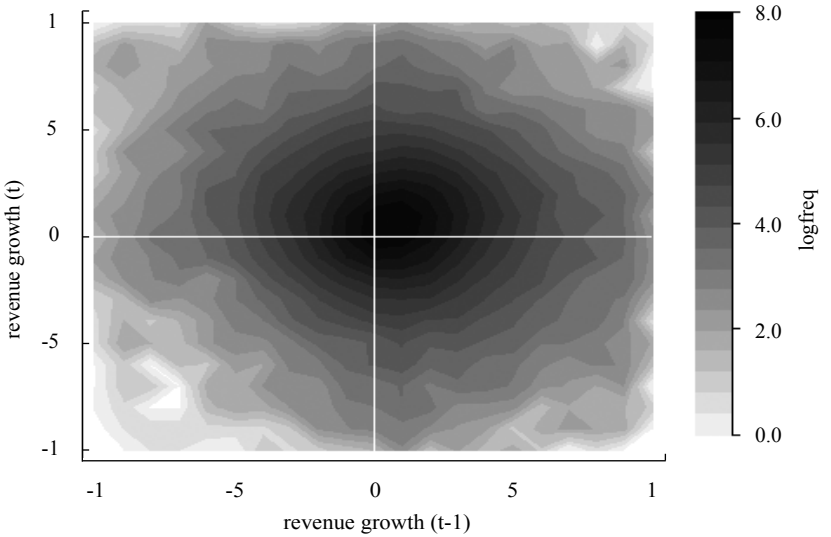
Source: Our calculations.

Figure 3.
Evolution of the 4 Moments of the Growth Rate Distribution Over Years.



Source: Our calculations.

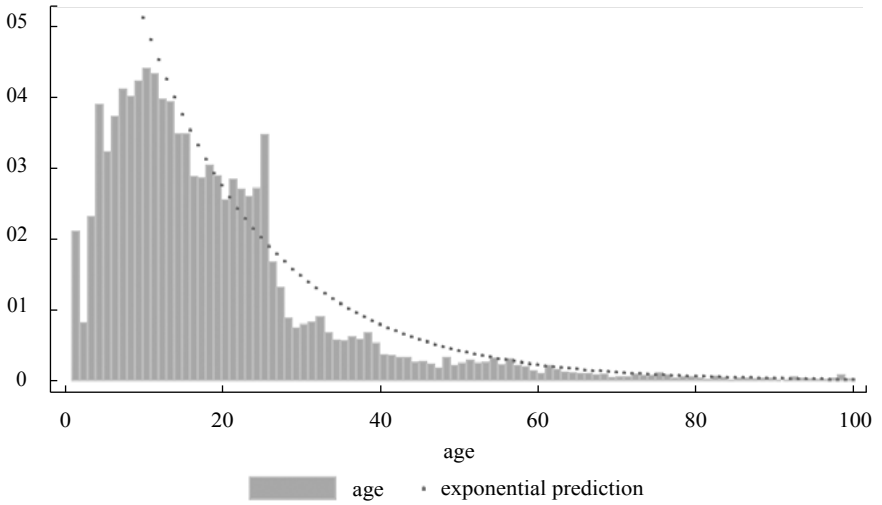
Figure 4.
Contour Plot of Revenue Growth in Consecutive Periods. All Years Pooled Together



Note: Colouring shades correspond to the frequency of the number of firms that have been categorized into logarithmic bins. White areas contain no observations without interpolation. The contour is delimited to growth rates ±1.

Source: Our calculations.

Figure 5.
Age distribution with reference to the year 2018, for ages up to 100. Firms aged over 100 are not plotted here. The fitted exponential distribution, which serves as an approximate visual aid, is inserted manually using OLS predicted values of (log of) number of firms of each age, for firms in the range 10-100 years.



Source: Our calculations.

Figure 5 shows the age distribution of firms in our sample. The majority of firms are relatively young, in the sense that they are less than thirty years old. Some firms are older than 100. To the extent that the true age distribution is exponential (Coad, 2010), or perhaps Weibull-distributed (Axtell, 2016), the fact that the mode of the age distribution occurs at age around ten suggests that firms aged less than ten years are under-represented in our dataset. An exponential fit is plotted alongside the empirical density, fitted for the range of firms that are ten or older, (because the mode is at around ten years) and for ages up to 100. Compared to the exponential fit, the empirical density has a relatively large number of firms aged in their early twenties (i.e. born in the 1990s), but, with a few notable exceptions (Marquina, 2010; Lavardo Gagliardi, 2013; Paan, 2013), relatively few firms in their thirties (i.e. relatively few born in the 1980s).

Analysis of HGFs

Descriptives of HGFs

The OECD-Eurostat definition of a High-Growth Firm refers to an average of 20% annual growth over a three-year period (Eurostat-OECD, 2007), i.e.:

$$\left(\frac{X_t}{X_{(t-3)}} \right) 1/3 - 1 \geq 0.20$$

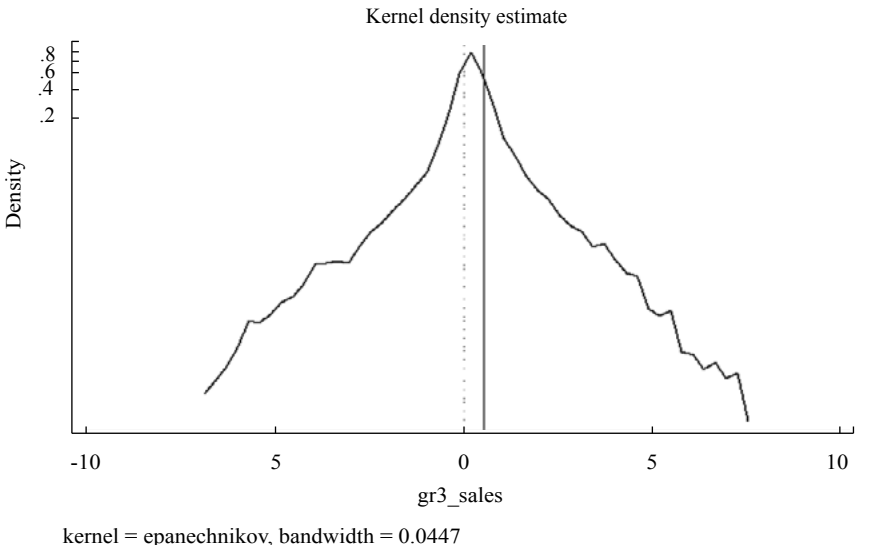
where X is the size of the firm in year t.[10] Some previous investigations into high-growth firms have thus often measured growth over a three-year period (Hölzl, 2014, Zhou, De Kok, Hartog, & Van Der Zwan, 2012; Daunfeldt, Johansen, & Halvarsson, 2015; Choi, Rupasingha, Robertson, & Leigh, 2017). Figure 6 presents the distribution of growth rates over a three year period, and illustrates the threshold above which the OECD-Eurostat definition would classify a firm as an HGF. Many firms in our sample have growth rates above this threshold.

HGFs by Sector

Are HGFs more common in certain sectors than others? Despite the excitement about high-tech HGFs, nevertheless HGFs are not more common in high-tech sectors (Mason & Brown, 2013; Daunfeldt, Elert & Johansson, 2016) although the survey by Henrekson and Johansson (2010) finds that they are over-represented in services.

[10] A further condition is that the firm should have ten or more employees in the initial year (t-3) (Daunfeldt et al., 2015). Given that we have incomplete data on employment, we focus on sales growth and ignore the 10+ employees restriction: a restriction which, in any case, has been criticized by some authors (Daunfeldt et al., 2015).

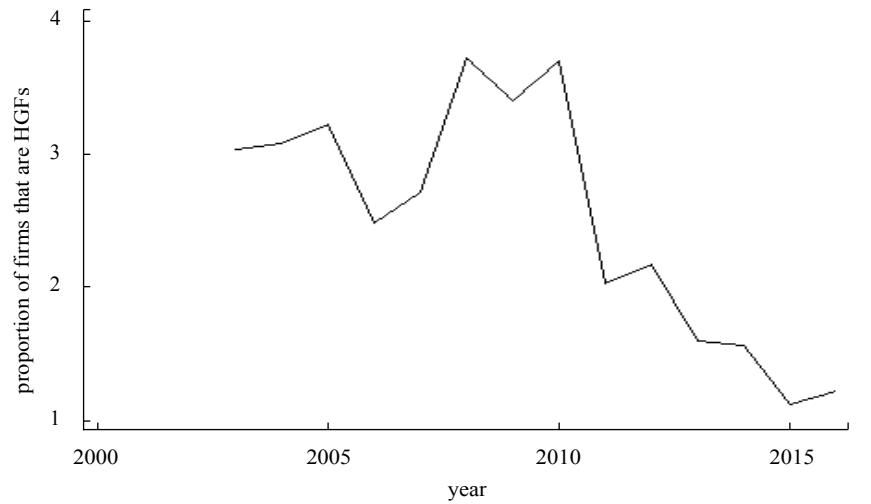
Figure 6.
Position of the threshold for being an HGF (solid line): growth (on average) of 20% each year over three years. The dotted line corresponds to growth = 0.000. All years pooled together.



Source: Our calculations.

Figure 7 shows that the number of HGFs has been decreasing in recent years. This could correspond to a slowing down of the Peruvian economy after the boom during the first decade of the 2000s.

Figure 7.
Proportion of HGFs in Each Year.



Source: Our calculations.

Table A1 (in the Appendix) shows the proportions of HGFs in each sector. To avoid the 'law of small numbers' statistical fallacy (Kahneman, 2011, Chapter 10), we focus on sectors with a larger number of firms.[11] Similar to Choi et al. (2017), we find a large share of HGFs in the construction sector. HGFs are also particularly common in public administration, 'other services', mining, finance, consultancy and services, real estate, and the agro-industrial and farming sector. HGFs are conspicuously less common in textiles, energy and water, printing, and law.

It should be remembered, though, that just because these sectors had a relatively large share of HGFs in the past, this is no guarantee that they will have many HGFs in future.

Comparing HGF numbers with Other Countries

How does the frequency of HGFs in Peru compare to other countries? Although we do not have access to microdata from other countries, nevertheless we can make use of some calculations reported by the OECD. In particular, we report the share of High-Growth Enterprises (turnover definition) of the SDBS Business Demography Indicators, for available years and countries.[12]

By international comparison, the Peruvian firms in our dataset have had an extraordinary growth performance (see Table 3). (Remember that our revenues data has already been deflated to remove inflation.) Compared to other countries, a relatively high share of them would qualify as HGFs. Other countries with high shares of HGFs are Latvia, Estonia and Bulgaria.

Regression Analysis on Growth

Our preceding non-parametric analysis is followed by some parametric regressions, which allow us to investigate the factors associated with growth and control for potentially confounding effects in a multivariate setting. We begin with logit regressions in Table 4, where the dependent variable is the firm's HGF status (taking values 1 for HGFs and 0 for non-HGFs). In Table 5, we focus on the factors associated with a firm's growth rate in an individual year, in an augmented Gibrat's law framework (Gibrat, 1931; Coad, 2009), to investigate the role of lagged size and other variables on the subsequent growth performance. Given that the growth rate distribution is not Gaussian, but displays a 'tent-shape' reminiscent of the Laplace distribution (see our Figure 2, and also Bottazzi et al., 2011), we prefer least absolute deviation (LAD) regression, also known as median regression, to the usual ordinary least squares (OLS) regression model.

[11]The 'law of small numbers' fallacy explains why extremely high or low frequencies are more likely to be found in groups with small populations. For example, it is more likely that someone will score 100% heads after flipping a coin three times than after flipping it a hundred times.

[12]See http://stats.oecd.org/, in particular: Industry and Services / Structural and Demographic Business Statistics / SDBS Business Demography Indicators / High-Growth Enterprises share (turnover definition).

Table 3.
Percentage of firms that are high-growth firms, where high growth is defined in terms of growth of (deflated) revenues.

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Peru	30.4	30.8	32.2	24.8	27.1	37.2	34.0	37.0	20.2	21.7	15.9	15.6	11.1	12.2
Canada			8.8	9.6	8.1									
Denmark			7.9	12	14.3									
Estonia			18.4	21.9	21.1									
Hungary			10.9	13.5	15.1									
Italy			5.2	8	8.9									
Latvia			23	27	34.1									
Norway			..	15.3	..									
Slovenia			11.5	12.8	13.8									
Sweden			..	11.8	14.5									
Bulgaria			17.5	22.3	..									
Romania			5.2	6.1	7.7									

Notes: Rate of High-Growth Enterprises (20% annual growth based on turnover), as a percentage. OECD data refer to Manufacturing, for firms with ten employees or more.

Source: Data for Peru comes from our TOP 10,000 dataset (deflated revenues growth). Data for other countries comes from the OECD SDBS Business Demography Indicators.

Table 4.
Logit Regression Results to Determine Which Firms are HGFs. Robust standard errors. Key to significance stars: *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)
	logit HGF_revenues	**logit HGF_revenues**	**logit HGF_revenues**
VARIABLES	**HGF_revenues**	**HGF_revenues**	**HGF_revenues**
log_revenues (3rd lag)	-0.471***	-0.450***	-0.520***
	(0.0100)	(0.0101)	(0.0106)
log_age		-0.316***	-0.355***
		(0.0179)	(0.0181)
No. branches			0.00812***
			(0.000848)
Importer dummy			0.383***
			(0.0288)
Exporter dummy			0.384***
			(0.0324)
State			0.312***
			(0.0962)
Sector dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Constant	5.874***	6.427***	7.185***
	(0.204)	(0.207)	(0.212)
Observations	52,986	52,902	52,443
Pseudo-R2	0.1096	0.1156	0.1282

Source: Our calculations.

Table 4 shows that younger and smaller firms are more likely to be HGFs, in keeping with a wide range of other studies (Henrekson & Johansson, 2010). Firms that are importers and exporters are more likely to be HGFs. Similarly, Table 5 shows that younger and smaller firms have lower growth on average.

In Table 5, the slightly negative coefficient on lagged growth suggests that revenues growth has a negative autocorrelation. Firms that grew rapidly in one period are unlikely to repeat this performance in the following period.

Tables 4 and 5 also show that revenues growth is more likely (whether measured in terms of HGF status or in terms of the annual revenues growth rate) for firms that have more branch offices ('sucursales') and that are active on an international scale (in terms of importing and exporting activity). Also, State-owned firms are more likely to be HGFs (Table 4) and to have higher growth rates (column (4) of Table 5).

Table 5.

Median regression results (i.e. quantile regression at the 50% quantile), along with OLS and panel fixed-effect least-squares estimates. Standard errors are clustered at the firm level. Key to significance stars: *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)	(5)
	LAD growth	**LAD growth**	**LAD growth**	**OLS growth**	**FE growth**
VARIABLES	**gr_revenues**	**gr_revenues**	**gr_revenues**	**gr_revenues**	**gr_revenues**
log_revenues (lagged)	-0.0215***	-0.0120***	-0.0173***	-0.0943***	-0.465***
	(0.000939)	(0.000856)	(0.00103)	(0.00350)	(0.00968)
gr_revenues (lagged)		-0.0209***	-0.0223***	-0.0733***	-0.000447
		(0.00289)	(0.00281)	(0.00831)	(0.00735)
log_age			-0.0170***	-0.0154***	0.0270
			(0.00168)	(0.00388)	(0.0285)
No. branches			0.000432***	0.00184***	
			(8.49e-05)	(0.000486)	
Importer dummy			0.0331***	0.0900***	
			(0.00280)	(0.00579)	
Exporter dummy			0.0207***	0.0787***	
			(0.00330)	(0.00666)	
State			0.0109	0.0803***	
			(0.00671)	(0.0254)	
Sector dummies	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes
Constant	0.413***	0.321***	0.362***	1.645***	8.077***
	(0.0187)	(0.0179)	(0.0209)	(0.0579)	(0.194)
Observations	69,489	53,959	53,394	53,394	53,394
R-squared	0.036	0.025	0.036	0.075	0.267
Number of RUC					9,345

Source: Our calculations.

CONCLUSION

This research note presents an exploratory study of HGFs in an emerging economy context that has, until now, escaped attention: Peru. Firms in our dataset enjoyed a bullish growth in revenues during the period studied. HGFs are relatively common in Peru, compared to other countries, although their share has decreased over the time span of our analysis. We confirm several previous findings, such as the heavy-tailed growth rates distribution, and the superior growth performance of small and young firms.

Our sample focuses on relatively large firms, and undersamples young firms. Indeed, it is difficult to obtain data on small Peruvian firms, because many small-scale entrepreneurs in Peru prefer to remain informal (Scott & Zelada, 2011; Andersson & Waldenström, 2017), and, hence, are not visible to data collectors. Further work could investigate the growth performance of samples of younger and smaller firms in Peru if data becomes available.

Our findings on the strong growth performance of Peruvian firms leads to questions about the role of HGFs in economic growth and recoveries. Is economic growth like a rising tide that lifts the growth rates of all firms? Or, on the other hand, do HGFs bring about large-scale growth through some kind of 'multiplier effect'? Which is the most important direction of causality? Future work could more closely investigate the causal relation between frequency of HGFs and economic development.

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APPENDIX 1

Table A1.
Intensity of HGFs in each sector. All years pooled together. Sectors are sorted, such that those with the highest HGF proportions appear at the top of the table.

SECTOR	Proportion HGFs	Total
Construction	0.352	1804
Research and Development	0.333	54
Public Administration	0.310	4508
Other Services	0.282	482
Mining	0.279	1129
Finance	0.271	2465
Consultancy and Services	0.269	3811
Real Estate	0.266	530
Agroindustrial and Farming	0.266	1690
Vehicles	0.256	1649
Fishing	0.253	676
Recycling	0.250	36
Transport	0.242	2003
Publishing	0.242	207
Computation	0.239	536
Hydrocarbons	0.236	1265
Mining Non-Metallic	0.226	434
Metalwork	0.220	2178
Telecom	0.220	537
Health	0.217	713
Renting (Machinery)	0.216	171
Organizations	0.213	465
Plastic	0.212	1054
Commerce	0.208	14883
Tourism	0.207	1985
Paper	0.205	244
Education	0.200	1448

(*Continued*)

Table A1.
Intensity of HGFs in each sector. All years pooled together. Sectors are sorted, such that those with the highest HGF proportions appear at the top of the table.

SECTOR	Proportion HGFs	Total
Recreation	0.198	460
Food	0.193	1105
Post	0.190	84
Pharmaceutical Labs	0.177	265
Chemical	0.171	914
Leather	0.169	142
Forestry	0.169	154
Beverage	0.165	170
Textiles	0.160	1295
Tobacco	0.154	13
Energy and Water	0.144	930
Printing	0.127	284
Lawyers	0.080	213
Total	0.234	52986

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CONTENIDO

ARTÍCULOS

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