Economic Growth and Cash Flows: Application to the Industrial Sector in the Departments of Antioquia and Valle del Cauca (Colombia)***

Crecimiento económico y flujos de efectivo: aplicación al sector industrial de los departamentos de Antioquia y Valle del Cauca (Colombia)

Crescimento econômico e fluxos de caixa: aplicação para o setor industrial dos departamentos de Antioquia e Valle del Cauca (Colômbia)

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Abstract

Objective: to determine the relationship between economic growth and cash flows of industrial sector companies in the departments of Antioquia and Valle del Cauca. **Methodology:** based on the financial statements that the industrial companies of Antioquia and Valle del Cauca reported to the Superintendency of Corporations between 1995 and 2013. The analysis was conducted with 102 companies in Antioquia and 65 in Valle, which

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made this an ongoing report. The analysis calculated the operating and financing cash flows with which these companies established the statistical relationship between the growth of the regional economy and data, from the same period, from the National Statistics Department of Colombia. **Results:** the statistical relationship between operating cash flows and growth of the regional economy increased in Antioquia by 0.389 and in Valle del Cauca by 0.879. This result was found to be unsatisfactory to make predictions, but when operating cash flows were added to financing, the statistical relationship increased to 0.740 in Antioquia, and Valle de Cauca to 0.818; more precise data to make cash flow prediction. **Conclusions:** due to the direct relationship between the cash flows of industrial sector companies in Antioquia and Valle del Cauca and the regional economic growth, it is possible to make predictions of future cash flows for companies in this sector.

Keywords: Economic growth; Cash flow; Liquidity.

Resumen

Objetivo: determinar la relación entre el crecimiento económico y los flujos de efectivo de las empresas del sector industrial de los departamentos Antioquia y Valle del Cauca. **Metodología:** se partió de los estados financieros que las empresas industriales de Antioquia y Valle del Cauca reportaron a la Superintendencia de Sociedades de 1995 a 2103. El análisis se aplicó a 102 empresas de Antioquia y 65 del Valle, que hicieron este reporte de forma continua. A estas empresas se les calculó los flujos de efectivo de operación y financiación con los cuales se estableció la relación estadística con el crecimiento de la economía regional durante el mismo periodo con datos del Departamento Nacional de Estadística de Colombia. **Resultados:** la relación estadística entre los flujos de efectivo de operación y el crecimiento de la economía regional aumentó en Antioquia en 0,389 y en el Valle del Cauca en 0,879; se encontró insatisfactorio este resultado para realizar predicciones, pero al sumarle los flujos de efectivo de operación a la financiación la relación estadística aumentó a 0,740 en Antioquia y en el Valle de Cauca a 0,818; dato más preciso para hacer la predicción de los flujos de efectivo. **Conclusiones** : por la relación directa entre los flujos de efectivo de las empresas del sector industrial de Antioquia y Valle del Cauca y el crecimiento económico regional, se pueden hacer predicciones de los futuros flujos de efectivo para las empresas del sector.

Palabras clave: Crecimiento económico; Flujo de efectivo; Liquidez.

Resumo

Objetivo: determinar a relação entre o crescimento econômico e os fluxos de caixa das empresas do setor industrial dos departamentos de Antioquia e Valle del Cauca. **Metodologia** : partiu-se dos estados financeiros que as empresas industriais de Antioquia e Valle del Cauca reportaram à Superintendência de Empresas de 1995 até 2103.A análise foi aplicada a 102 empresas e a 65 do Valle, que fizeram este relatório continuamente. Foram calculados os fluxos de caixa de operação e financiamento destas empresas e baseado nestes, foi estabelecida a relação estatística com o crescimento da economia regional durante o mesmo período com dados do Departamento Nacional de Estatísticas da Colômbia. **Resultados:** a relação estatística entre os fluxos de caixa de operação e o crescimento da economia regional cresceu em Antioquia 0.389 e no Valle del Cauca 0,879; este resultado foi encontrado insatisfatório para fazer previsões, mas ao adicionar os fluxos de caixa de operação ao financiamento, a relação estatística aumentou para 0,740 em Antioquia e no Valle del Cauca para 0818; o qual é um dado mais preciso para prever os fluxos de caixa. **Conclusões:** pela relação direta entre os fluxos de caixa das companhias do setor industrial de Antioquia e Valle del Cauca e o crescimento econômico regional, podem ser feitas previsões de fluxos de caixa futuras para as empresas do setor.

Palavras-chave: Crescimento econômico; Fluxo de caixa; Liquidez.

Introduction

In previous works (Escobar, 2014), companies' cash flows in the industrial, commercial, services and agricultural sectors were analyzed between 2002 and 2010, in some Colombian regions. This study reviewed its operation, financing and investment structures and determined their relationship with some macroeconomic variables such as employment level, inflation, the representative market rate, gross domestic product and the index of the Colombian stock exchange, during the same period. Some findings demonstrated the positive correlation between the variables analyzed, such as, gross domestic product, employment level, the representative market rate, and cash flows, among others.

Based on this, and based on the aforementioned study, there is a theoretical gap in the relationship between the results of cash flows and some macroeconomic variables. Thus, there was an in-depth investigation into the relationship, where variables such as economic growth, cash flows and their impact on these variables may be present. As a result, a prediction can be made for industrial sector companies in the department of Antioquia and Valle del Cauca, with a sample of 102 companies in Antioquia and 65 in Valle del Cauca.

Ou and Penman (1989), Sloan (1996), Luo (2008) and Loewk (2014), among others, presented results on the prediction of cash flows for subsequent periods, based on variables, such as: historical cash flows; the main financial statements, made up of the balance sheet and income statement or economic situation; working capital; income; costs; and other financial reporting under the International Financial Reporting Standards (IFRS). One of its conclusions is that in order to make a more accurate forecast of cash flows, additional variables must be used, although they do not indicate which ones; however, none of them worked on predicting the relationship between economic growth and historical cash flows.

In this sense, there is a theoretical gap between the relationship that these two variables may have and the way in which they are combined to establish a prediction of cash flows based on these results. Accordingly, the following research question arose: What is the relationship between economic growth and cash flows in companies in the industrial sector of Antioquia and Valle del Cauca between 1995 and 2013?

Based on this, the following objectives were proposed: firstly, to establish the theoretical and practical relationship between economic growth and cash flows; secondly, to establish the correlation between economic growth and cash flows for companies in the industrial sector of the department of Antioquia and Valle del Cauca during 1995-2013; and finally, as a result of the study, to propose a system that allows cash flows to be projected based on the variation presented

by growth. This observation is based on the fact that the independent variable is economic growth and the dependent variable is cash flows.

With such results, entrepreneurs may have additional information to make their cash flow forecasts, since, with internal and external information they are able to make more adequate financial planning to forecast their working capital, future investments, payment of dividends and financial obligations, among other activities related to the disbursement or acquisition of monetary resources or liquidity.

In addition, an analysis is presented in which we establish the relationship that some economic events may have with cash flows for the regions and during the same time period, in such a way that it can be demonstrated that the correlation between the two variables can be explained in a quantitative and qualitative way.

Finally, it is hoped that entrepreneurs in the sector, trade unions and the educational institutions can count on an additional tool to make decisions aimed at the economic growth of their organizations, since with more objective or scientific information they are able to obtain more accurate results regarding cash flows.

Methodology

It is a correlational research in which the effect of the independent variable -economic growth- was established, since the dependent variable represents cash flows. In addition, the research is longitudinal in nature, since it evaluates several continuous periods in each of the variables: economic growth and cash flows during 1995 and 2013.

The database (SIREM) was used to collect the information, which is operated and provided free of charge by the Superintendency of Companies. This database can be found on the entity's website (www.supersociedades.gov.co).

In order to determine the Gross Domestic Product, the information provided by the World Bank was used, an entity that has estimated GDP growth projections for the year 2017. To determine the population, the number of industrial sector companies from the departments of Antioquia and Valle del Cauca (Colombia) that reported financial statements to the Superintendency of Corporations during 1995 was established, of which, 102 companies met this requirement in Antioquia and 65 companies in Valle.

However, in order to determine the sample, the companies that reported financial statements to the Superintendency of Companies between 1995 and 2013 were taken on a continuous basis. It was decided in this way, considering

that in the periods in which there is no report, they would have zero data for the development of the statistical application, an aspect that would affect the results of the statistical correlation. For the departments of Antioquia and Valle del Cauca, which are the subject of this study, the following number of companies was obtained: Antioquia 102 and Valle del Cauca 65.

In order to achieve the objectives, the method operated as follows:

• The historical Gross Domestic Product (GDP) was counted from 1995 until 2013.
• The cash flows of the companies studied were calculated from the financial statements: Balance Sheet and Income Statement, data provided by the Superintendency of Companies between 1995 and 2013.
• The sum of the cash flows was obtained from the 102 companies in the industrial sector in the Antioquia region and the 65 companies in the industrial sector in the Valle region, to which the statistical model was applied.
• The Statistical Package for the Social Sciences (SPSS) established the degree of linear association between GDP and cash flows (relationship), which provided important information to determine the econometric model used to establish future cash flows.
• A description of the economic events that occurred in each region between 1995 and 2013 was made in order to determine their relationship with the cash flow results.

For the estimation of future cash flows for the period, in accordance with the projected GDP estimate, a linear regression of cash flows to a GDP model was used as follows:

$$F.E.E. = Constant + (C \times C.E.) + Error[1]$$

In which:

F.E.E. = Expected cash flow.
C = GDP ratio.
C.E. = Expected economic growth.

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1. SPSS system back pressure

For the verification and validity of the regression of the data and the proposed model, statistical tests were carried out such as The Student's T, which consists of verifying whether "two groups differ significantly from each other with respect to their mean values" (Sampieri, et al., 2006). To determine the validity of the model, the level of test significance must be less than 0.05 (Creswell, 2005).

Another test that applies to the regression model is that of Fisher (1925), which examines the equality between population variances of two variables with normal distribution. For acceptance of the test under this parameter, its significance level must be less than 0.05. The third test is the determination coefficient, which shows the value that can explain the effect of the independent variable on the dependent variable. As this gets closer to 1, it means that there is a greater degree of correlation and therefore the data is more homogeneous to make prediction models (Creswell, 2005). The next statistical test to determine the linear regression model is normality, which shows whether the data of the analyzed variables have a normal distribution, insofar as their level of significance is less than 0.05, indicates that the data is homogeneous; that is, that they are within the normal distribution. Therefore, the data is reliable for constructing the Leon and Montero prediction models (2003).

Homoscedasticity was the last test applied to check the validity of the model, which consists of determining the equality between the variances of the variables analyzed. In order to determine that the test is valid, its result must be greater than 5% according to the Aranaz (2002) test. The linear regression model was used because it determines the effect of one variable on another (Sampieri et al., 2006); so that, in the case of this paper, it is possible to determine the effect of economic growth as an independent variable on cash flows as a dependent variable.

Results

The main variable linking cash flows and economic growth was found to be liquidity. This variable is provided by the financial system, such as cash flows to companies so that they can make the necessary investment and thus contribute to economic growth. This is based on the relationships between economic agents, as Aceves and Martínez point out (2013), who demonstrated that, in an efficient financial system that provides resources to companies through credit, these resources are invested efficiently for the growth of the economy and, at the same time, these resources (liquidity) come from company and family savings, as shown in the following graph:

Graph 1. Relations between economic operators.
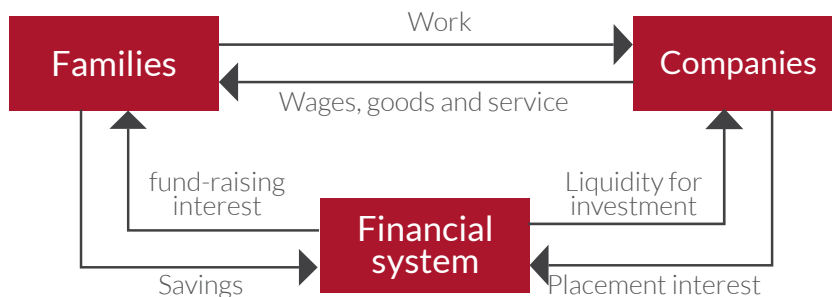
Source: Prepared by the authors

According to the graph, families provide companies with work so that they can produce goods and services that will then be offered to families to meet their needs; on the other hand, families receive a salary for work activity in companies. The families allocate part of this salary (income) to consumption and part to savings, which is captured by the financial system that provides resources to companies to make their investments. Families, by bringing their savings into the financial system, receive a compensation known as the fund-raising interest rate, and companies recognize the financial system as a rate for using loanable money, which is known as the placement interest rate. The difference between the fund-raising and placement interest rate is called the financial intermediation rate.

Similarly, the graph shows that the financial system is responsible for delivering liquidity to companies so that they make the necessary investments to produce more and offer more goods and services to the economy; at the same time, the greater the production, the families will receive more income and will be able to consume more and save more. This is the case, to the extent that, as Solow (1956) indicates in his economic growth model, there will be greater investment in capital and therefore greater economic growth. This is how companies can also have greater resources (cash flows) through profit, given that, they produce more and sell more, they will also have greater liquidity that can be used to increase capital.

The financial system is responsible for providing part of the liquidity required by companies to make their investments; this provision is said to be partial because the total liquidity comes from the sum of the credits and liquidity surpluses that companies obtain for their business exercise. In order for the

financial system to provide this liquidity, it offers various financing instruments so that entrepreneurs, in accordance with their needs and requirements, can choose the options that best suit their needs and make the necessary investments (Levine 1997).

In order to provide these resources, the financial system over time has specialized in the formation of different types of entities that place savings in resources so that companies can make their investments; among them, there are some such as banks, financial corporations, the stock exchange, second-tier banking and fiduciaries.

On the one hand, Terceño and Guercio (2011) show that the development of the financial system is directly involved in economic growth, i. e. there is a correlation between the financial system and growth. The study carried out by these authors was applied in Latin American countries, including Colombia.

On the other hand, in a study carried out between 1990 and 2007 by the same authors, they made a comparison between the development of the financial system and its impact on economic growth in countries such as Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela. They found that the correlation between the development of the financial system and economic growth is "high and indisputable" and the highest correlation between these two variables was found in countries such as Brazil, Colombia, Mexico and Peru.

To determine the correlation, the authors used bond market capitalization as the main variable. This, as a financing instrument, provides liquidity to companies so that they can make their investments, an aspect in which they found that in Colombia the correlation is 0.90 against a value of one (1), which is an almost perfect correlation. This indicates that in Colombia the injection of liquidity by the financial system to contribute to economic growth is high through the bond market. This conclusion is also reflected in the daily trading performance of the Colombian stock exchange. According to data from 2001 to date (in 2001 the BVC was created in Colombia as a result of the merger of the Medellín, Bogotá and Cali stock exchanges) the bond market represents an average of 75% of the total daily transactions.

Another author who points out that in Colombia there is economic growth based on the financial market is Ruiz (2004), who by means of an econometric analysis in which the stock and bond markets are used as variables, found that there is a high statistical relationship between the liquidity provided by financial instruments and the growth of the economy.

In this context, there are several types of financial institutions in Colombia that fulfill their role as intermediaries by providing the necessary liquidity to companies, enabling them to carry out their investments and supporting the growth of the economy, among them:

Table 1. Entities that provide liquidity to companies and families in Colombia

Entity	Type of products	Placement (clients)
Banks	Saving accounts, current accounts, bank insurance, free investment credit, promotion, treasury long-term resources, short-term resources, vehicle, housing, working capital, SMEs, leasing, factoring, installment discounts, letters of credit, trusts, among other placement and collection products.	People Large companies. Medium companies. Small businesses.
Financial corporations	Fund raising through Term Deposit Certificates, placement of resources to promote the Colombian industry through long-term loans.	Industry (today in Colombia there are only two entities of this type because in the crisis of the late 1990s and early 2000s, most of these entities disappeared. Another reason is the lack of capacity to diversify financial products when collecting and placing them).
Commercial Finance Companies	Recruitment of resources through Term Certificates of Deposit and placement of resources to promote trade through medium and short-term loans.	Marketers. Entities that ceased to exist in Colombia for the same reasons that were presented for financial corporations.
Companies specialized in leasing	Financial leasing system used by many companies to recompose their capital assets. There are several types of leasing: financial, operational, real estate, syndicated, import, international.	People. Large, medium and small companies.
Trustees	Contract for the administration of monetary resources, real estate assets and administrative trusts.	People. Legal persons. (This is not a resource placement system, only an administration system.
Stock exchange	Place of transaction of short-term and long-term financial assets (Stocks, bonds, and foreign exchange.)	People. Legal persons.
Pension and severance funds.	Fundraising for pension and individual severance payments. They do not place resources on natural and legal persons.	People.

Source: Prepared by the authors based on Escobar (2014).

In order to demonstrate the above, the following table shows, through the financing cash flows, the average debt acquired by companies in the industrial sector between 1995 and 2013 at current prices, resources that can be used for different activities such as investment. The following data was obtained in the departments of Antioquia and Valle del Cauca:

Table 2. Average debt value acquired by companies in Antioquia and Valle del Cauca during 1995 - 2013 in thousands of pesos.

Department / region	Value of average debt acquired during the period 1995 - 2013 in thousands of pesos.
Antioquia	4.138.217
Valle del Cauca	4.164.774

Source: Prepared by the authors using data extracted from the Superintendency of Companies (2014).

A statistical correlation was used to establish the degree of correlation between changes in economic growth and operating cash flows for all the companies in the departments. In order to establish this correlation, the DANE data was extracted, obtaining GDP per year from said entity and the deflation was calculated[2] at 2008 prices, with the purpose of matching both the value of GDP and cash flows to the same base. The value of GDP was then obtained at constant 2008 prices; for this process, the following formula was applied:

GDP at 2008 prices = (GDP current prices/deflator) x 100

Then, with each of the constant GDP data at 2008 prices, economic growth was elaborated, which is the result of establishing the variation presented by constant GDP between 1995 and 2013. To determine this variation, the following formula was used:

Variation in GDP = Ln current period - Ln from previous year

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2. It consists of putting the values of a time series in the same period or base, with the purpose of analyzing the values of the series in a determined period of time and being able to make comparison between the data. The time base is generated by DANE, the last update of base prices being 2008.

The formulas for deflating GDP and the calculation of their respective variation were obtained from author William Sharpe (2003).

Finally, in order to establish the correlation between the variables, the Superintendency of Corporations obtained operating cash flows for each of the companies in each year. The value of these cash flows at constant prices based on 2008 was then established to make the comparison of the data at the same time; thus, the data obtained by the statistical correlation are more homogeneous, which allowed us to reach more reliable conclusions. Table 3 shows the results of the described process.

Table 3. Economic growth and cash flows for the departments of Antioquia and Valle del Cauca, period 1996-2013.

Year	Economic Growth in Antioquia during the 1996-2013 period	The deflated cash flow rates in Antioquia during the 1995-2013 period	Economic growth in Valle during the 1996-2013 period	The deflated cash flow rates in Valle during the 1995-2013 period
1996	-3,29%	310.596.521	-1,43%	353.774.826
1997	4,70%	380.172.109	0,35%	268.226.711
1998	-4,56%	371.503.792	-0,41%	302.684.597
1999	-0,63%	366.009.220	-1,61%	280.640.958
2000	0,28%	530.955.705	0,22%	613.681.295
2001	-0,05%	509.150.932	0,62%	600.368.623
2002	2,05%	530.902.384	1,45%	512.604.708
2003	3,02%	378.282.082	1,94%	559.194.472
2004	9,35%	455.916.323	5,26%	672.645.628
2005	4,97%	461.389.936	2,05%	596.226.974
2006	7,52%	590.258.460	9,10%	846.580.066
2007	6,15%	626.432.326	6,98%	792.939.665
2008	-0,46%	511.347.904	−0,57%	672.407.337
2009	2,87%	412.324.945	4,50%	582.516.657
2010	2,51%	471.006.545	1,23%	678.940.737
2011	8,40%	452.446.568	3,77%	691.535.311
2012	5,63%	396.834.546	4,24%	627.831.968
2013	3,92%	521.128.520	4,75%	554.856.077

Source: Prepared by the authors using data from DANE (2014).

In order to establish the statistical correlation between economic growth and operating cash flows in Antioquia and Valle del Cauca, the economic growth presented between 1996 and 2013 (table 3) was considered, and was related to the deflated cash flows shown in the table. A correlation of 0.389 and 0.879 was obtained in the department of Antioquia and Valle respectively, which is a low result in order to make predictions. Based on this, the transaction and financing cash flows were added to determine the correlation between the variables, in order to demonstrate that the theory applies to reality insofar as, by injecting liquidity into the companies, they take advantage of these resources to make investments that point to greater economic growth.

By making this calculation between the operating and financing cash flows and correlating it again with economic growth, the result of the statistical correlation in Antioquia amounted to 0.740 and in Valle del Cauca to 0.818; this demonstrates that the variables can be used to perform the regression analysis and the subsequent prediction of cash flows.

With regard to the statistical correlation between the variables economic growth and cash flows from operations and financing, the homogenization of data shows better results to demonstrate that when companies generate a higher flow, better growth results can be obtained as resources are used for growth (Levine 1997). With the demonstration that the data are more homogeneous and reliable to predict flows, this was done under the following formula:

$$F.E.E. = Constant + (C \times C.E.) + Error$$

Where F. E. E. is the expected cash flow, C the ratio of GDP, C. E. the expected economic growth. The expected economic growth is obtained from the World Bank, and according to consultations with several economists, the data presented by this institution is reliable. The error that will be used as a verifier of the model to determine if it is statistically functional with the indicator of normality and homoscedasticity, bearing in mind that the error is for each of the observations of the variables.

On the other hand, according to the World Bank's growth projections for economic growth, the following data was obtained:

Table 4. Economic growth projections for Colombia for the years 2014 - 2017

Period	Projected economic growth
2014	4.7%
2015	4.4%
2016	4.3%
2017	4.3%

Source: compiled by the authors using data extracted from the World Bank (2015).

This table shows that the economic growth projections are decreasing year by year, which indicates that cash flows should also decrease according to the data produced by the statistical regression and the correlation between economic growth and cash flows. Economic growth is established for Colombia, given that, in the search for information there are no projections of economic growth for the departments analysed. In the process of statistical regression, using the same variables and to establish the appropriate model for cash flow prediction, the following data was obtained:

Table 5. Statistical regression analysis for the departments of
Antioquia and Valle between 1996-2013.

Period	Antioquia	Valle del Cauca
Constant	182.696.086	404.471.757
Coefficient of GDP	68.246.497	89.286.870

Source: Prepared by the authors.

Based on the result of the above table, the following formula is established for predicting future cash flows:

$$\text{F.E.E.} = 182.696.086 + 68.246.497 \times \text{GDP}$$
$$\text{F.E.E.} = 404.471.757 + 89.286.870 \times \text{GDP}$$

The constant means that if the GDP value of a period is zero (0%), i. e., if growth is zero, the cash flows of industrial sector companies together will have a value for the department of Antioquia of $182,696,086 and for the department of Valle del Cauca of $404,471,757. The GDP coefficient means that, in the

event of a change in growth of 100%, cash flows will increase by $68,246,497 for Antioquia and Valle by $89,286,870; it will also increase by $68,246,497; in other words, if GDP decreases by this amount, future cash flows will decrease. Hence, determining the presented model is statistically valid for the departments of Antioquia and Valle, so the same model tests were performed as those for the other regions with the following data:

Table 6. Statistical tests of the bivariate regression model for Antioquia and Valle departments.

Test	Test result	Acceptance of the test
Student's T: Antioquia Valle del Cauca	4.404 5.689	X
Fisher: Antioquia Valle del Cauca	19.392 32.367	X
Coefficient of determination: Antioquia Valle del Cauca	54.8% 66.9%	X
Normality: Antioquia Valle del Cauca	0.977 0.932	X
Homoscedasticity: Antioquia Valle del Cauca	39.4% 5.5%	X

Source: Prepared by the authors.

According to the results in the table above, the model is valid for predicting future cash flows in the face of a given change in GDP, since it complies with all the statistical tests presented.

To determine the effect of the economic variation on cash flows, the formula of the established model is applied and tested with different variations in GDP; to measure the change in cash flows, the formula was assembled and a simulation was carried out in which GDP varied by one percentage point, with the following results.

Table 7. Results of the change in cash flows for Antioquia departments due to changes in

GDP of one percentage point.

Constant	Coefficient of GDP	Initial GDP	Final GDP	Value of cash flow at initial GDP	Value of cash flow with final GDP	Variation in cash flow
182.696.086	68.246.497	- 5%	- 4%	179.283.761	179.966.226	0.3807%
182.696.086	68.246.497	- 4%	- 3%	179.966.226	180.648.691	0.3792%
182.696.086	68.246.497	- 3%	- 2%	180.648.691	181.331.156	0.3778%
182.696.086	68.246.497	- 2%	- 1%	181.331.156	182.013.621	0.3764%
182.696.086	68.246.497	- 1%	0%	182.013.621	182.696.086	0.3750%
182.696.086	68.246.497	0%	1%	182.696.086	183.378.551	0.3736%
182.696.086	68.246.497	1%	2%	183.378.551	184.061.016	0.3722%
182.696.086	68.246.497	2%	3%	184.061.016	184.743.481	03708%
182.696.086	68.246.497	3%	4%	184.743.481	185.425.946	0.3694%
182.696.086	68.246.497	4%	5%	185.425.946	186.108.411	0.3681%
182.696.086	68.246.497	5%	6%	186.108.411	186.790.876	0.3667%

Source: Prepared by the authors.

Table 8. Results of the change in cash flows for the Valle del Cauca departments due to changes in GDP of one percentage point.

Constant	Coefficient of GDP	initial GDP	Final GDP	Value of cash flow at initial GDP	Value of cash flow with final GDP	Variation in cash flow
404.471.757	89.286.870	−5%	−4%	400.007.414	400.900.282	0.223%
404.471.757	89.286.870	−4%	−3%	400.900.282	401.793.151	0.222%
404.471.757	89.286.870	−3%	−2%	401.793.151	402.686.020	0.222%
404.471.757	89.286.870	−2%	−1%	402.686.020	403.578.888	0.221%
404.471.757	89.286.870	−1%	0%	403.578.888	404.471.757	0.221%
404.471.757	89.286.870	0%	1%	404.471.757	405.364.626	0.220%
404.471.757	89.286.870	1%	2%	405.364.626	406.257.494	0.220%
404.471.757	89.286.870	2%	3%	406.257.494	407.150.363	0.219%
404.471.757	89.286.870	3%	4%	407.150.363	408.043.232	0.219%
404.471.757	89.286.870	4%	5%	408.043.232	408.936.101	0.218%
404.471.757	89.286.870	5%	6%	408.936.101	409.828.969	0.218%

Source: Prepared by the authors.

Based on these results, it is verified that whenever economic growth is zero percent (0%) the value of the cash flows will be equal to the value of the constant and that, for each percentage point that the GDP varies, the cash flows will vary by 0.37% in the department of Antioquia and 0.22% on average in Valle. Variations in GDP ranged from -5% to 6%, since on this scale of variation in GDP the data is normally distributed.

According to this, if we wanted to establish the variation that will have the industrial sector cash flows of the departments of Antioquia and Valle, this variation must be used; that is, if the expected GDP increases by one percentage point, it must increase its cash flows by 0.37% and 0.22% for the next period; and if it is a decrease in the same percentage, it must reduce its flow by -0.37% and -0.22%. Also, for each variation by 0.1% or -0.1% it must increase or decrease its flow by 0.037% and -0.037% and 0.022% and -0.022%, respectively.

In this way, the expected changes in GDP according to World Bank data will be 4.7% in 2014 and 4.4% in 2015. Therefore, the variation in budgeted GDP will be -0.3% which means that cash flows should vary for Antioquia by -0.11% (-0.037% x 3 x 100) and for Valle by -0.06% (-0.022% x 3 x 100). Furthermore, in 2016 the expected growth in GDP is 4.3%, where the variation with respect to 2015 is -0.1%, therefore, cash flows should decrease for Antioquia by -0.037% (-0.037% x 1 x 100) and for Valle by -0.022% (-0.022% x 1 x 100). For 2017, no change in GDP is expected, so there will be no change in cash flows. The above is presented in the following table:

Table 9. Prediction of cash flows for 2014 - 2017 for companies in the industrial

Period	projected GDP	Expected value of cash flows	Variation in cash flows	Expected value of cash flows	Variation in cash flows
2014	4.7%	185.903.671		408.668.240	
2015	4.4%	185.698.932	-0.110%	408.400.379	−0.066%
2016	4.3%	185.630.685	-0.037%	408.311.092	−0.022%
2017	4.3%	185.630.685	0.000%	408.311.092	0.000%

Source: Prepared by the authors.

Conclusions

Sloan (1996), Maya (2002) and Gabás (1994) point out that the prediction of companies' future cash flows must be made through internal variables such as: prevous income, working capital, prevoius share prices, inventories, etc. However, Ismail and Choi (1996) tried to explain future cash flows through the relationship that these could have with some economic factors such as competition, the size of the company and the type of product it offers, but none of them were able to make predictions and found that some variables correlate better than others with cash flows.

In this context, what this paper proses does not seek to determine that the uses of other variables are not important in the prediction of cash flows, but it is necessary to take into account others such as economic growth, where the theoretical gap that was worked on in this analysis is located.

The relationship between economic growth and cash flows is determined as the liquidity available to companies to allocate resources for investment, which will later support economic growth; however, companies often do not have sufficient resources or liquidity to carry out such investments. They therefore use the financial system to collect additional resources that can leverage the Levine investment (1997). For this reason, empirical evidence was found that almost 100% of the companies analyzed used financial credit to leverage their operations and investments.

In the departments of Antioquia and Valle, approximately 56% of the years analyzed show a direct correlation between the variables economic growth and cash flows. These regions are characterised by the coffee sector and the industrial sector being the main players in generating the growth of the regional economy. In recent years, however, these have moved to a second line and sectors such as construction and services are supporting GDP growth. It should be noted that departmental industries in their cash flows depend on export performance and domestic revenues.

It is concluded that to the extent that cash flows are more liquid, this availability of additional resources improves the correlation between the variables. During the course of this work, a correlation comparison was made between economic growth and operating cash flows in the industrial sector.

In addition, the correlation between economic growth and the sum of operating and financing cash flows was made, reaching an approximate of 0.77, which means that by injecting liquidity into the companies, they have greater availability of resources that are used for the investment that leads to economic growth, as Levine (1997) indicates. This increased liquidity is provided by the

cash flows from Terceño and Guercio financing (2011), which are the result of obtaining monetary resources through the financial system.

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