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Econometric Analysis of the Determining Factors of Default in Chilean Companies

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ABSTRACT

Measuring the growth of a country can be affected by different factors, such as services available to the population, political-social stability and financial health of both households and companies, among others. In general, with these indicators, what is sought is to be able to find the phenomena or factors that explain what is happening. A case that is always of public interest is knowing the financial status of a company, given the impact they have on society, whether they are micro, small, medium or large companies. Based on this, and given that today the information inputs are different and extensive, which can come from government entities as well as private ones, this work seeks to establish an explanation of what are the factors that influence whether a company may fall into default. To do this, a multivariate econometric analysis is used, through which it has been established that factors such as the number of partners of a company are not predominant factors in the default of a company, unlike the number of workers or assets.

Keywords: Default policy, Company efficiency, Econometric modelling, Chilean companies

INTRODUCTION

Applying statistical methods and techniques to analyze the economy or test economic theories based on information collected over different periods of time are the cornerstones of Econometrics (Nzabirinda, 2023), whose aim is to quantify relationships, estimate, or predict events that can be leveraged to develop public policies or improvements in industrial processes (Ljeh, 2023). Given these existing tools, Chile has been characterized by generating various ways of communicating the country's economic behavior, whether by evaluating its monetary policy (Banco Central de Chile, 2023) or by analyzing delinquency in payments (COMISIÓN PARA EL MERCADO FINANCIERO (CMF Chile), 2022; Fernández, 2023; Universidad San Sebastian - Equifax, 2023). Delinquency is understood as the failure of a debtor (individual or company) to meet payment obligations at the predetermined time (Fernández, 2023). It is crucial to make financial information visible with the goal of informing citizens about the current economic situation in the country and establishing future trends in this regard.

Typically, economic series analyses have always focused on groups of people or households, either by commune or region at an aggregate level. However, it is less common to find analyses related to companies, despite the fact that government entities such as the Internal Revenue Service (SII) (Servicio de Impuestos Internos, 2023a) can provide tax information on companies (Servicio de Impuestos Internos, 2023b) that is accessible and would allow, for example, evaluating the country's productive capacity, as assessed in various parts of the world (Nagy & Valaskova, 2023; Llobet-Dalmases, Plana-Erta, & Fito, 2017; Vivet, 2011; Kliestik, Siekelova, & Misankova, 2017). In Chile, companies are classified according to their billing ranges. It is possible to infer that there may be interaction with other local entities, such as the Commission for the Financial Market (CMF), which is the regulatory and financial supervisory entity of Chile and which, through its study areas, constantly evaluates companies from a credit perspective. Similarly, other entities like the Superintendency of Insolvency and Re-entrepreneurship, focus on reorganization or liquidation when companies declare bankruptcy (COMISIÓN PARA EL MERCADO FINANCIERO (CMF Chile), 2022; Superintendencia de Insolvencia y Reemprendimiento, 2022).

Therefore, considering the aforementioned, and taking into account the information provided by the SII and the analyses of the CMF and the Superintendency of Insolvency and Re-entrepreneurship, it is proposed that it is feasible to analyze the factors that could explain why a company falls into default and subsequently becomes bankrupt. Accordingly, this work aims to identify the most predominant factors in a company's default based on the currently available information from the Internal Revenue Service (Servicio de Impuestos Internos, 2023a, 2023b; Subdirección de Gestión Estratégica y Estudios Tributarios, 2022) and financial information (COMISIÓN PARA EL MERCADO FINANCIERO (CMF Chile), 2022; Superintendencia de Insolvencia y Reemprendimiento, 2022), in order to establish an econometric analysis at the business level.

THEORETICAL FRAMEWORK

Measuring the financial health of companies is crucial as it influences decision-making processes such as hiring more staff, opening new branches, or determining the need for greater capitalization. However, assessing the financial health of companies is challenging due to multiple factors, which apply to both large firms and microbusinesses, including startups.

Various studies discuss the factors that should be considered to understand why a company may fall into default or bankruptcy (Kliestik, Siekelova, & Misankova, 2017; Cernisevs, Popova, & Cernisevs, 2023). These factors include the number of employees, accumulated debts, acquired assets, participating partners, company age, and compliance with government regulations.

In Chile, companies can declare their initial number of employees upon incorporation (Subdirección de Gestión Estratégica y Estudios Tributarios, 2022). Additionally, annual income statements allow companies to update

their employee count, providing public data that can be used to estimate a company's year-over-year growth (Sainakh, 2023). This information is not only vital for evaluating growth but also for understanding a company's phase, whether in expansion or market consolidation (Llobet-Dalmases, Plana-Erta, & Fito, 2017).

Furthermore, depending on the number of employees, unions can be formed in Chile, contributing to the sustainable growth of companies and ensuring fair treatment of workers (Labor Code, articles 221, 227, and 305). This unionization can balance oversight between the company and its employees, transcending political implications.

Acquired debts by a company should not necessarily be seen negatively but as an indicator of credit solvency and trust with banking entities, retailers, or the government (Vivet, 2011). However, overdue debts may signal financial issues within the company, affecting its performance and leading to a potential downward spiral (Constantinescu et al., 2018).

Asset ownership plays a significant role for companies in terms of properties, machinery, or vehicles, especially during crises where they can be quickly liquidated for cash flow (Cernisevs, Popova, & Cernisevs, 2023; Gutterman, 2023). Conversely, owning assets involves maintenance costs and requires careful management to prevent catastrophic damages (Gutterman, 2023).

The composition of a company's partners, both individuals and companies, is also crucial (Servicio de Impuestos Internos, 2023a, 2023b). The number and nature of partners can influence the company's direction and potential internal conflicts (Olanitori, Ademulegun, & Adeyefa, 2022; Reed & Reed, 2009). Additionally, the partners' reputation can impact the company's ability to raise investment capital.

The age of a company, defined by its incorporation date, is monitored from the time it starts invoicing (Servicio de Impuestos Internos, 2023a, 2023b; Cámara de Diputados y Diputadas - Chile, 2022; Subdirección de Gestión Estratégica y Estudios Tributarios, 2022; Cernisevs, Popova, & Cernisevs, 2023). This age factor is contrasted with the company's turnover years to ensure its viability and profitability.

Finally, the number of years a company has been in operation is considered by governments to quantify business consolidation over time and its sectoral distribution, which directly relates to unemployment rates and regional financial health (Gutterman, 2023).

Each company must comply with regulations specific to its sector, such as those for chemical production. Non-compliance can result in fines or factory closures, impacting the company's financial solvency (Rodríguez López & Piñeiro Sánchez, 2013).

In summary, this work proposes evaluating which of the aforementioned factors are most predominant in the default of companies. The research question is: Is it possible to determine the factors affecting the default state in Chilean companies using econometric modeling techniques? The objective is to analyze the determining factors of default in Chilean companies through measurements and econometric modeling. The specific objectives are: i) to specify the state of the art that explains the theoretical foundations of company default determinants, ii) to study and analyze the state of available data

from private entities to determine the factors affecting the default situation in Chilean companies, and iii) to evaluate and analyze the determining factors of company default in Chile through econometric modelling

METHODOLOGY

The data for this study was provided through collaboration with Equifax, a company specializing in financial and data analysis. A confidentiality agreement was established for this purpose. The dataset comprises 590,998 records with a total of 12 variables. Generally, these variables are numerical and continuous, exhibiting central tendency and dispersion measures, aligning with the research objectives and the theoretical framework previously outlined.

It is noteworthy that the data from Equifax is an amalgamation of various sources, including the Internal Revenue Service, Labor Directorate, and Santiago Chamber of Commerce. This data is interconnected using the RUT (Unique Tax Roll) of each company. It is crucial to note that the RUT of each company is sensitive information and is not disclosed in this study; it is merely used as an anonymized identifier comprising numbers and letters to ensure uniqueness.

The dataset for this study encompasses a specific time window, namely August 2023, and includes only active companies, defined as those having issued at least one invoice in the past 12 months. Hence, this dataset represents a sample of the nearly 2.5 million companies established in Chile to date (Servicio de Impuestos Internos, 2023a; Subdirección de Gestión Estratégica y Estudios Tributarios, 2022).

Considering the various factors to be analyzed and the objective of identifying relationships within the TOTAL_MORA_UF variable associated with the aforementioned dataset, the implementation of multivariable regression is recommended. Multivariable regression aids in discovering correlations between the dependent and independent variables, thereby enabling predictions about default behavior, which is the focus of this study. The application of multivariate regression spans fields such as politics, economics, medicine, and others, and will be explored in this research (Ljeh, 2023; Ríos-Vásquez & de la Fuente-Mella, 2023). Now, to carry out this research, the set of factors is used to evaluate the default capacity of companies. Therefore, the regressive model includes as an endogenous variable the variable TOTAL_MORE_UF, which is measured in Unidad de Fomento (UF). Therefore, for regressive modeling, the exogenous variables of the model are the following: N_WORKERS, VEHICLES_QUANTITY, VEHICLES_AVALUO_UF, AMOUNT_BANK_DELARES, AMOUNT_DELAY_RETAIL, AMOUNT_FINE_UF, AMOUNT_INFRA_UF, NUMBER_PARTNERS, AVALUO_CANT_BBRR, AVALUO_TOTAL_UF, COMPANY_YEAR. With respect to the regressive multivariate evaluation, the general model in its functional form is specified by the following equation:

$$TOTAL\_MORE\_UF_i$$
$$= \beta 0 + \beta 1 * N\_WORKERS\, i + \beta 2 * VEHICLES\_QUANTITY\, i + \beta 3$$
$$* VEHICLES\_AVALUO\_UF\, i + \beta 4 * AMOUNT\_BANK\_DELARES\, i + \beta 5$$

$* AMOUNT\_DELAY\_RETAIL\ i + \beta\ 6 * AMOUNT\_FINE\_UF\ i + \beta\ 7$
$* AMOUNT\_INFRA\_UF\ i + \beta\ 8 * NUMBER\_PARTNERS\ i + \beta\ 9$
$* AVALUO\_CANT\_BBRR\ i + \beta\ 10 * AVALUO\_TOTAL\_UF\ i + \beta\ 11$

$\qquad * COMPANY\_YEAR\ i + \mu i$

RESULTS

It is possible to appreciate the levels of individual and joint significance for the variables of the equation model with the exception of the variables VEHI-CLE_QUANTITY and NUMBER_PARTNERS, which are not significant at the 5% level. The variability of the endogenous variable TOTAL_MORE_UF is explained in 42% of the sample by the variability of the exogenous variables. Therefore, the model meets the assumptions of the autocorrelation test (Durbin-Watson Test = 2.094, dl = 1.617, du = 1.832, $\alpha = 0.05$) and the heteroskedasticity test (White Test = F statistic: 0.821750; P value = 0.7155). Furthermore, the model presents adequate information criteria (Akaike: -6.665764, Schwarz: -6.412801; Hannan-Quinn: -6.565058). There are also no problems of multicollinearity or partial correlations.

In summary, the set of exogenous variables collected in the literature manage to explain the total default measured in UF of the companies in the sample. Finally, an inverse relationship is observed between the variables VEHICLES_AVALUO_UF and CANT_PARTNERS, with the total amount of default of the companies (TOTAL_MORE_UF), therefore, these variables are not relevant to explain the default of the active Chilean companies analyzed in this work.

On the other hand, the following variables represent a direct relationship with the total amount of companies' arrears: N_WORKERS, AMOUNT_BANK_DELARES, AMOUNT_DELAY_RETAIL, AMOUNT_FINE_UF, AMOUNT_INFRA_UF, AVALUO_CANT_BBRR, AVALUO_TOTAL_UF, COMPANY_YEAR.

Based on these results, we can establish that the default of companies can be explained by the established factors, and, in addition, it was found that some of these have no direct relationship with the variable that was attempted to be explained. Finally, the results presented so far allow us to propose that it is possible to develop other investigations that can be linked to the design of risk models, aimed at being used as a kind of traffic light in the face of possible risks of bankruptcy of a company by analyzing the exposed factors.

CONCLUSION

Based on the results presented in the previous section, it is evident that the number of partners and the number of vehicles are not statistically significant at the 5% level. Additionally, the vehicle factor, when valued in UF (Unidad de Fomento), exhibits an inverse relationship with the total arrears variable in UF, unlike other variables which show a direct relationship with the endogenous variable in the equation. Therefore, the number of partners and vehicle ownership do not constitute relevant factors in analyzing the default of Chilean companies, considering that the companies analyzed are

'active' (having invoiced in at least the past 12 months) and represent the total number of companies in Chile within a specific month, encompassing both SMEs and large enterprises. Furthermore, the study of defaults encompasses not only debts from banks or retail creditors but also from other factors contributing to a company's default, thereby adding robustness to these findings.

Regarding the number of employees, an increase in their number entails more responsibilities for an organization, both in terms of capital and governmental obligations. In Chile, non-compliance with established payment obligations related to working days can lead to legal issues with the Labor Directorate. This variable is directly related to delinquency, aligning with the observation that delinquency in Chile is concentrated in small and medium-sized companies, which typically have fewer employees (Aravena Francisco, 2019).

On the other hand, the number of delinquent documents with banking and retail institutions does impact the Total Default of a company, as expected. Unlike controlled debts, which can be beneficial, failure to meet obligations or falling into default can incur fines and penalties under the law, akin to the consequences of not paying a contracted debt.

In the case of assets and company age, these factors significantly influence the endogenous variable of non-performing loans (NPL). This aligns with the understanding that a longer-established company may accumulate more debt over time. Regarding assets, their maintenance can be costly, but they can also be liquidated to resolve debts.

In conclusion, this study demonstrates the feasibility of conducting an econometric analysis of default in Chilean companies using the examined factors.

Furthermore, this work opens avenues for future complementary analyses. For instance, additional data from Equifax, including geographic coordinates of companies, could enable geospatial analyses and evaluations of company environments. This, combined with information on company size (micro, small, medium, or large) and sector, could yield insights into their influence on urban dynamics, such as commute times and local services. Such analyses were not conducted in this study due to the required time for data processing. Moreover, the data could also be employed to develop a company risk model, provided detailed historical information on companies with good and bad financial behaviors is accessible. In summary, the data provided by Equifax offers a range of potential evaluations crucial for estimating and evaluating company performance in Chile, which in turn reflects the country's economic health.

On the other hand, we find that this research could be interest of firm-for increase its level investments in employee human capital, because are critical for the labor productivity and internationalization in fast internationalizers, but not for those firms that internationalize more slowly, in relation to its low probabilities of falling into deafult.

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