BOX IV.2
CORPORATE GROUPS AS A UNIT OF ANALYSIS FOR FINANCIAL STABILITY

There is growing interest in the study of how interconnections among economic agents influence the propagation and amplification of idiosyncratic shocks[1]. At the firm level, ownership relationships can accentuate or attenuate shocks affecting firms that are part of a corporate group. On the one hand, an ownership network can diversify the risk facing the group and thus function as a mitigator[2]. On the other, ownership networks can act as propagation and contagion channels within the group and even outside it. Consequently, the assessment of financial risks and vulnerabilities requires not only an analysis at the level of the individual firm, but also at the level of the corporate group. This is the approach that is usually adopted in this Report for the group of firms that *report* to the FMC, where there is public information on the ownership networks of these firms.

This box examines the ownership and control network for the universe of firms in Chile, extending the analysis of corporate groups to non-reporting firms, which represent the vast majority of companies in Chile (table IV.3)[3]. The results shows that there is a positive correlation between bank debt default at the individual level and at the level of the corporate group, which suggests that adverse events can propagate across the ownership network, in line with the literature. The analysis is based on a recent study (Canales et al., 2019) that uses IRS administrative records to identify the ownership and control relationships for all firms in Chile.
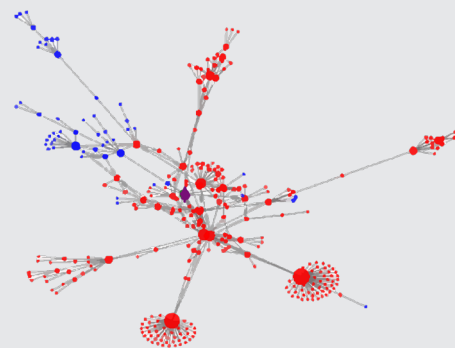
Ownership, control, and corporate groups

The IRS administrative records contain information on the ownership relationships between companies[4]. In 2017 there

were over 290,000 direct ownership relationships between approximately 190,000 firms, defined as the percent ownership that firm i has in firm j. Based on these direct relationships, we can obtain the universe of indirect relationships between firms, defined as the percent ownership that firm i has in firm j through its participation in firms other than firm j. Next, control relationships between companies are defined as the links in the final ownership network (direct and indirect) where the ownership share is over 50%. Finally, for the purposes of this box, a corporate group is defined as a set of firms that are linked through at least one control relationship.

Diagram IV.2 provides an illustration of ownership and control relationships between firms and the corporate group to which some of the firms belong. Each node in the network corresponds to a different firm, and each link represents a direct ownership relationship between the adjacent firms. At the center of the network is a purple diamond, which represents the head of the control group, in which no other firm has an ownership share. The color red represents the corporate group, and the color blue corresponds to firms that are related through an ownership, but not a control, relationship.

DIAGRAM IV.2
Example of ownership and control structures (*)

(*) The purple diamond corresponds to the top corporation in the group. The red nodes are firms that are controlled by the top corporation, and the blue nodes are corporations with which the top corporate has a non-controlling ownership relationship. The size of the nodes represents the number of direct connections (ownership and/or control relationships) of the respective firms.

Source: Central Bank of Chile, based on data from the IRS.

[1] See, for example, Acemoglu, Carvalho, et al. (2012) or Acemoglu et al. (2016). Glasserman and Young (2016) provide a detailed summary of recent works.
[2] In particular, groups can reallocate resources internally to accommodate their investment, employment, and intangible resources (Giroud and Mueller, 2015, 2019; Matvos and Seru, 2014; Atalay et al., 2014). Furthermore, the availability of financial resources in related firms can reduce the need for external financing (Saona et al., 2018).
[3] This analysis only includes firms registered as taxpayers in Chile. This implies, for example, that some of the corporate groups of non-reporting firms with external debt may be incomplete.
[4] These records do not include tax information on the firms. They are based on data sources that are updated at different frequencies, and the sources used can vary year to year. This box uses data corresponding to the 2018 tax year.

This example illustrates how, in an analysis of different firms at the individual level, they may appear to be independent entities, when in reality their decision-making is potentially linked and may even be centralized. Thus, in principle, the decision to move or share resources, such as labor or financing, between the red nodes could be made centrally.

Some characteristics of corporate groups in Chile

Of the nonbank firms that are usually analyzed in this *Report*, 13% are part of a corporate group. There is a positive correlation between the size of the firms and their membership to a corporate group. Firms that are part of a group account for 70% of bank debt and 51% of jobs. In addition, corporate groups are present in different types of firms. While nearly 90% of FMC-reporting firms pertain to a group, a significant share of firms with local financing (12%) are also part of a group (table IV.3). Moreover, among firms with local financing, a large share of debt and employment is concentrated in firms that pertain to a corporate group (57 and 43%, respectively).

TABLE IV.3
Characteristics of firms with and without a corporate group (2017)
(percent of total firms, 2018)

	w/o corporate group			w/ corporate group		
	N° firms	Debt	Jobs	N° firms	Debt	Jobs
	87	30	49	13	70	51
Reporting	11	6	5	89	94	95
Firms with external debt	23	5	8	77	95	92
Firms with local bank debt	88	43	57	12	57	43
No debt	87	0	63	13	0	37

Source: Central Bank of Chile, based on data from the FMC and IRS.

Corporate groups and bank loan default

A series of recent studies identifies ownership networks as a transmission channel for adverse shocks affecting individual firms[5]. To the extent that this type of shock compromises a firm's repayment capacity and, through its ownership links, that of other firms in the corporate group, the linkages can amplify the impact of the original shock. In this case, the exposure of lenders to the default risk of a corporate group can be greater than the sum of the risks of the individual firms in the group.

Thus, the positive correlation between the default of a firm and the default of its group can be important for the analysis of financial stability.

To evaluate the existence of this correlation in the Chilean data and, in particular, among firms with local financing—where default is a relevant phenomenon, as emphasized in section 4 of this chapter—the percent of delinquent bank debt at the individual firm level is graphed as a function of the delinquency of the corporate group to which each firm pertains, excluding the delinquency of the explained firm.

The exercise reveals that there is, in fact, a positive correlation between the two variables. Furthermore, a simple estimation of this correlation using individual data shows that it is statistically and economically significant (figure IV.20). Notably, although default is infrequent (around 4% in the sample analyzed), a 1% increase in delinquency at the group level is associated with 0.74% increase in delinquency in the member firms.

While this evidence does not provide a quantification of the transmission channel of adverse shocks through ownership networks among firms, it does show that the analysis of these networks is important for the quantification of the risks and vulnerabilities that affect financial stability.

GRÁFICO IV.20
Relation between default of the individual firm and the rest of its corporate group (*)
(percent of delinquency of the firm's total debt, 2017)

$$Y = 0,02 + 0,74X$$
$$(R2 = 0,12)$$
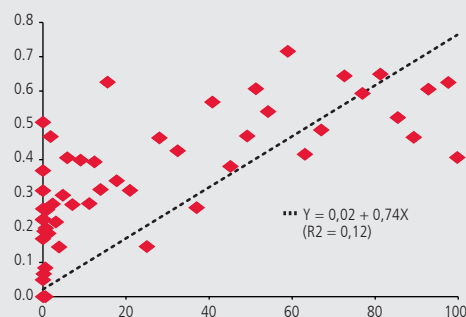
(*) The figure shows the relationship between the percent of a 90-day arrears over the total commercial bank debt of a given firm (vertical axis) and the percent of arrears of the rest of the corporate group excluding that firm, weighted by the size of the debt of each firm in the group (horizontal axis). The red dots represent the averages of the variable on the vertical axis for groups of observations according to the variable on the horizontal axis. Includes 50 of these groups. The dotted line represents the results of a lineal regression between the two variables using individual observations. Standard errors of estimated coefficients of the regression are in parentheses.

Source: Central Bank of Chile, based on data from the FMC and IRS.

[5]/ See for instant, Silva et al. (2018), Poledna et al. (2018), Abreu et al. (2019), Glattfelder (2013) or Larrain et al. (2019).

Conclusions

This box presents an analysis of corporate groups for the universe of firms in Chile. The analysis shows that the existence of corporate groups, defined through ownership networks among companies, is not infrequent, even among firms with local financing. It also shows that there is a positive correlation between default at the level of individual firms and the level of the corporate group to which they belong. These results highlight the importance of corporate groups as a complementary unit of analysis to individual firms in terms of financial stability monitoring.