Chapter 13

A Network-Based Approach to the Implications of the COVID-19 Pandemic on the Latin American Minimum Variance Portfolio

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ABSTRACT

Since the COVID-19 pandemic outbreak a growing body of literature has observed uncertainty among the main factors driving investor behavior, with these becoming more likely to seek risk minimization strategies, such as the minimum variance approach based on Modern Portfolio Theory. In this chapter a network-based

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minimum variance approach to portfolio diversification is carried out with assets from Latin America's five largest stock exchanges between 2018 and 2021. Global Minimum Variance Portfolios are obtained with the use of structural information contained in partial-correlation networks and a community detection process. The main objective is the investigation of the implications of the pandemic on minimum variance diversification in the region through an analysis of portfolio asset selection and allocation results, including risk and return performance, benchmarked against naïve investment portfolios.

INTRODUCTION

The March 2020 coronavirus disease (COVID-19) pandemic outbreak is perhaps the most tribulated time in financial markets since the 2008 Global Financial Crisis (GFC) (Rehman et al., 2022, p. 2). Literature on initial market reactions has observed uncertainty among the key factors driving investor behavior (Aslam et al., 2020, p. 59; Dai et al., 2021, p. 2; Ramelli & Wagner, 2020, p. 652). Under higher uncertainty, investors likely shift their focus to minimum-risk strategies (Yousfi et al., 2021, p. 1; Zhang et al., 2020, p. 2).

The minimum-variance methodology derived from Modern Portfolio Theory (MPT) (Markowitz, 1952) gained momentum following the GFC. It consists of determining the portfolio with the lowest risk at any given level of returns, known as the Global Minimum Variance Portfolio (GMVP) (Chow et al., 2011, p. 38; Clarke et al., 2011, p. 31). Moreover, network-based methodology has introduced new diversification approaches where markets are depicted as complex networks, and their structural information is applied in the construction of GMVPs (Breard & Katenka, 2016, p. 69; Hüttner et al., 2018, p. 63; Onnela et al., 2003, p. 6).

Little research has investigated the COVID-19 pandemic's impacts on GMVPs beyond 2020 (Chiang, 2022, p. 2; Madonia & Guidi, 2020, p. 3). The Latin America and the Caribbean region (LAC) in general have received little attention (Balash et al., 2020, p. 121). While these markets were hit hard, losing on average an estimated 46% in aggregate value during the first quarter of 2020 (Rehman et al., 2022, p. 2), little is known how the LAC GMVP's diversification benefits and composition have changed since then.

Considering that pandemic-related ambiguity, inflation, and weak economic growth prospects further fueled uncertainty in the region (IMF, 2021, pp. 10, 13, 18, 16), the pandemic's implications on LAC GMVPs should be of special interest to risk-averse investors likely to be affected by market turmoil there. Moreover, the lack of research considering the period beyond the outbreak suggests a literature gap concerning minimum variance diversification on a broad level.

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