Inelastic Markets and Fund Flows

April 2023

Abstract

Standard asset pricing models imply that stock markets should be highly elastic to changes in flows, implying a low price impact. Using fund monthly data on portfolio holdings in Brazil from 2005 to 2022, we estimate the elasticities of supply and demand from fund flows to stock market index prices. Consistent with inelastic markets, we find a supply elasticity of 1.5 and a demand elasticity of 3.4. These imply that a 1% demand shock to net equity flows leads to a 0.5% aggregate stock price increase and a 0.8% flow increase. These findings are consistent with inelastic supply and demand curves.

JEL Codes: E44, G12, G23.

Keywords: Asset pricing, market elasticities, institutional investors, sources of volatility, portfolio choice.

Introduction

Standard asset pricing models imply that securities have perfectly elastic demand (e.g., Modigliani and Miller (1958), Sharpe (1964), and Grossman and Stiglitz (1980)). This is a consequence of the usual assumption that individual securities have perfect substitutes. As prices are determined by the present value of expected future cash flows, arbitrageurs keep demand curves flat by providing liquidity following supply and demand shifts unrelated to valuation changes. This should make the price elasticity of demand very high, to the order of 5,000 or above (Petajisto (2009)).

However, many empirical papers have shown that individual stocks have inelastic demand curves (Shleifer (1986), Wurgler and Zhuravskaya (2002), Chang et al. (2015)), and Ben-David et al. (2018). These papers estimate the micro-elasticity of stocks, that is, how much the price of a stock changes relative to a change in demand for the same stock. They estimate values that are between 10 to 200 times smaller than the elasticity implied by standard models. Several mechanisms have been used to explain these results, like the existence of limits to arbitrage (De Long et al. (1990)) and differences between investors' investment mandates (Petajisto (2009) and Chang et al. (2015)).

In this paper, we take advantage of a dataset of monthly portfolio holdings of mutual funds to estimate the supply elasticity and the demand elasticity of equity fund flows to stock market index prices. We say that the dataset is granular because shocks to a few large funds can affect aggregate variables (the economy is composed of grains of volatility, as introduced by Gabaix (2011)). We use the framework of the granular instrument variables (GIV) proposed by Gabaix and Koijen (2021) and estimate a supply elasticity of 1.5 and a demand elasticity of 3.4.

Our elasticities measure the sensitivity of the price of one security (e.g., stock prices) to changes in the quantity of another type of security (bond flows). Other recent papers that estimate macro-elasticities are Gabaix and Koijen (2022), which estimates the elasticity of fund flows to stock prices in the U.S., and Camanho et al. (2022), which estimates the supply elasticity of international equity flows to the exchange rate.

We use monthly data on portfolio holdings and flows for all investment funds in Brazil between January 2005 and June 2022. The GIV allows us to address the classic endogeneity problem that stock prices and equity fund flows are jointly determined and that elasticities cannot be estimated by simply running OLS regressions. The GIV proposes as the instrument a linear combination of funds' idiosyncratic demand shocks that are orthogonal to the supply shocks and the common shocks. In the simple version we employ, the GIV is the value-weighted aggregate equity net inflow minus the aggregate equally-weighted equity net inflow. The GIV puts a high weight on large funds. Intuitively, if a large fund suffers an idiosyncratic demand shock for flows, then it will change the aggregate demand and total supply of flows, which allows us to estimate the flow supply elasticity.

Our dataset has several advantages relative to previous research based on U.S. data. For instance, The regulations of Brazil governing investment funds mandate the monthly disclosure of all securities held by individual funds, regardless of the value of assets under management. In comparison, the 13F filings required by the Securities & Exchange Commission (SEC) in the U.S. are disclosed only at a quarterly frequency. Furthermore. only qualified institutions above $100 million of assets under management have to report holdings at the fund-family level, which aggregates different funds managed by the same asset manager. Finally, only long positions in equity are reported. We can uniquely identify a fund by its tax identification number and observe all types of securities held by a fund. The different securities include equity as well as bonds and derivatives.

The remainder of this article is divided as follows. Section 1 presents the literature review on flow elasticity to stock prices and lays out our contribution. Section 2 describes the institutional setting of Brazilian mutual funds. Section 3 draws on the mechanisms behind the inelasticity of stock markets. In section 4, we present the dataset and descriptive statistics. Section 5 models the supply and demand elasticity of flows to stock prices and the theoretical foundations of the GIV as the instrument that identifies the elasticities, proposes the empirical specifications and discusses our results in detail. Section 6 presents the final remarks.

1 Literature Review and our contribution

The literature on elasticity estimation has seen major progress. This is due to (i) greater data availability and (ii) advances in econometric identification techniques. The literature can be split into two groups: micro- and macro-elasticity estimation. Within the macro-elasticity literature, the objective is to study how the aggregate stock market's valuation increases if one buys \$1 worth of stock by selling \$1 worth of bonds. In contrast, the micro-elasticity literature looks at how the relative price of two stocks changes if an investor buys \$1 of one stock, and sells \$1 of the other. A common feature in both cases is the concept of the price impact multiplier, which is the percentage change in prices when an investor purchases or sells a certain fraction of the shares outstanding in a particular company. Once we move to the price impact multiplier, there is an intersection with the empirical market microstructure estimates of price impact, which also evolved substantially in the last decade.

Gabaix and Koijen (2022) present a non-exhaustive list of works that studied elasticity, both micro and macro. Lou (2012) studies the impact of mutual funds on the cross-section of equity prices. The author constructs a measure of demand shocks to individual stocks by projecting mutual fund flows onto the stocks they hold and documents a significant flow-induced price pressure effect in individual stock returns. Therefore, the paper is circumscribed to micro-elasticity literature. In particular, predictable price pressure is the result of capital flows from retail investors to mutual funds and from mutual funds to individual stocks. This flow-driven price effect can fully account for both mutual fund performance persistence and to partially explain stock price momentum. The findings of the study imply that capital flows contribute to excess stock return co-movement. After adjusting for common risk indicators, equities that are expected to receive inflow-induced money tend to move in tandem. The same holds true for equities whose sales are anticipated to be caused by outflows.

A recent paper by Peng and Wang (2023) shows that mutual funds do not just passively scale up or down their existing portfolios based on retail flows. In fact, they also rebalance for a variety of other reasons, such as factor rebalancing. The paper is built on the premise that mutual funds target a few well-known factors such as value and momentum and have persistent demand for these factors. After all, it is possible to quantify the implied price elasticity associated with factor rebalancing. However, as duly noted by the authors, they do not model the demand system or have an exogenous variation in demand and have to make an additional assumption that the demand is inelastic. Therefore, Peng and Wang (2023) put their paper in the context of studies that examine inelastic demand-induced price pressure.

Camanho et al. (2022) develop a model in which international equity funds rebalance into foreign/domestic equity assets in equilibrium. They implement the GIV methodology to show that these international portfolio flows causally lead to exchange rate movement and to estimate the supply elasticity of exchange rate to currency flows.

Finally, Gabaix and Koijen (2022) have contributed to the literature by developing the instrument variables (GIV) methodology. This novel framework works effectively to address the endogeneity that results from the combined determination of equity fund flows and stock prices, as well as the fact that elasticities cannot be quantified using straightforward OLS regressions.

Our contribution to the literature is twofold. First, we investigate a dataset with enough information to let us cast some light on some questions of portfolio allocation and price elasticity. Second, to the best of our knowledge, this is the first work to estimate demand and supply price elasticity for a country other than the United States that has a vibrant and relevant stock market and asset management sector.

2 Institutional Setting: Brazilian Mutual Funds

The mutual fund industry in Brazil has expanded significantly over the past ten years, with a 34% growth in assets under management. Using data from the International Investment Funds Association (IIFA), Brazil has the second largest mutual fund sector among emerging markets after China, being comparable to that in the United Kingdom, with 2.32% of the worldwide net assets as of the last quarter of 2022.[1] As of December 2022, the total net assets are equal to USD 1.483 trillion, or 74% of GDP in 2022. For comparison, assets under management in the United Kingdom account for 60% of GDP.

[1]The data is available at `https://iifa.ca/resource/collection/F547F196-E1D9-4F8C-8D4F-7507D8BCAB4C/IIFA_-_Worldwide_Open-End_Fund_Report_-_Q4_2022.pdf`.

The regulatory framework for the mutual fund industry in Brazil fundamentally changed in 2002. In that year, the supervisory mandate of the analogue of the Securities and Exchange Commission for Brazil (Comissão de Valores Mobiliários, CVM) was extended to all investment funds, taking over the regulation of fixed-income funds from the Central Bank of Brazil. The oversight of CVM is complemented by the Financial and Capital Markets Association of Brazil (ANBIMA) supervision, which acts as a self-regulatory organization for the mutual fund industry.

The regulations in Brazil classify funds according to their investment mandate. The regulatory goal is to inform investors about the main risk factors that a fund is exposed to. Based on the official classification, each fund is classified into one of the following categories: (i) equity, (ii) fixed-income, (iii) foreign exchange, and (iv) balanced/mixed funds. The regulator also sets the minimum amount that must be invested in each asset class to be compliant with the classification. For equity, funds must invest at least 67% of their portfolio in stocks, including ETFs and Brazilian Depositary Receipts (BDRs). Fixed-income funds must have at least 80% of their portfolio invested in assets that are related to interest rate instruments, with the balance allowed to be invested in any other asset class, including stocks. Foreign exchange funds must have a minimum of 80% of the portfolio in assets directly related, or synthesized through derivatives, to currency price movements. There is no minimum threshold for balanced/mixed funds.

In December of 2022, the market share of fixed-income funds account for 57.2% of total net assets in the Brazilian industry, followed by balanced/mixed funds with 32.9% of TNA, equity funds with 9.7% of TNA, and foreign exchange funds with 0.2%.

A specific feature of Brazilian funds is the presence of strict regulatory leverage constraints. Investment managers cannot take loans on behalf of the funds they manage, which implies a strict limit on balance sheet leverage for all funds. Securities lending and reverse repo operations, in turn, are only allowed when realized through exchanges and clearing houses authorized by a local regulator. This implies that equity lending operations are cleared through centralized counterparty clearing houses (CCPs), always guaranteed, and registered at B3, the Brazilian exchange, through its securities lending system.

The use of derivatives for mutual funds is also regulated. Historically, trades using derivatives are made through the exchange and, therefore, centrally cleared. Additionally, CVM requires every fund to disclose, on its by-laws, whether or not it utilizes derivatives only for hedging purposes. If a fund is allowed to use derivatives in a manner that results in a leveraged position, then CVM also requests it to inform the maximum possible leverage allowed as a percentage of its net asset value.

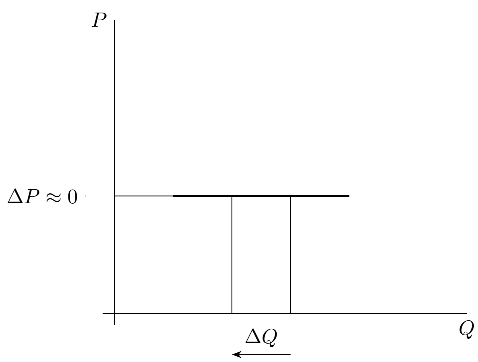
Finally, mutual funds must also comply with a second set of constraints on securities and issuers' concentration. For example, investment funds must have less than 20% of their net asset value invested in securities issued by a given financial institution, 10% for a listed company, and 5% for other private companies, unless specified otherwise by the regulator.

3 Demand Elasticity in Stock Markets

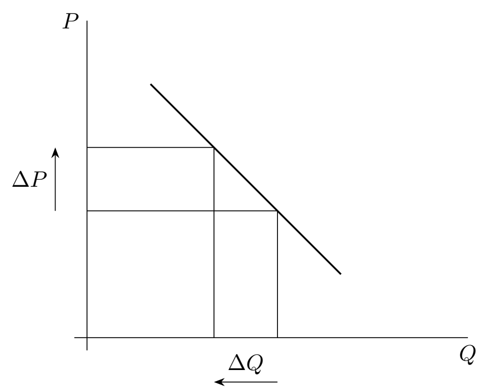
Inelastic markets imply substantial market volatility. In principle, stock prices should not be affected by flows into the stock market, since stock prices reflect the present value of expected future cash flows. Only changes in expectations about future cash flows or their discount rates can affect market prices. Any change in flows unrelated to changes in real variables should be readily fulfilled by market participants. In this case, prices would not be affected by changes in flows.

However, market frictions or behavioural biases might delay the transmission of information to asset prices. Market frictions can be in the form of portfolio constraints that mandates mutual funds to maintain a certain amount of investments in stocks independently of market conditions. Behavioural biases can be in the form of preference shocks, as modelled by Gabaix and Koijen (2022), which change investment flows and in turn affect asset prices. When such forms of friction or biases exist, a decrease in flows into the stock market would imply an increase in stock market prices. A decrease in inflows into the stock markets happens, for example, when funds sell stocks to buy fixed-income assets.

The effect of flows on asset prices can be seen in figure 1. Changes in flows have a small effect on stock prices if markets are elastic, as shown in panel 1a. On the other hand, inelastic markets imply substantial changes in market prices for the same change in flows, as shown in panel 1b. The large variation in stock returns is difficult to be reconciled by standard asset pricing models, as first shown by Mehra and Prescott (1985). Having inelastic markets is an additional source of variation that helps explain the high volatility of returns. As Gabaix and Koijen (2022) state, inelastic markets change the focus of analysis from sources of variation of the stochastic discounting factor, found in the literature of macro-finance, to sources of variation of stock market flows. Variations in stock market flows can be attributed to observable changes in market conditions.



(a) Elastic demand



(b) Inelastic demand

Figure 1. Elastic and inelastic demands. Changes Q are proxied by changes in flows. A decrease in flows implies a larger increase in prices in inelastic markets.

4 Data

Our data come from CVM (Comissao de Valores Mobiliarios), the analogue of the Securities and Exchange Commission for Brazil. The regulations for investment funds in Brazil mandate the disclosure of all security holdings of the portfolio of a fund. The disclosure should be made monthly, with a delay of up to 90 days, and regardless of the value of its assets under management. As detailed below, this contrasts with the requirements in the U.S., as asset managers have to disclosure their long holdings every quarter if the have more than $100 million dollars in assets under management. Our dataset has a higher frequency and it comprises all funds.

Each fund is identified by its tax identification number (CNPJ). We can observe all securities held by the fund, such as equity, bonds, and derivatives, both for long and short positions. Derivatives holdings include not just single-stock options but also information on futures, swaps, forwards, and options for all types of underlying assets. There is also comprehensive information on holdings of fixed-income securities issued by firms, banks and the government.[2]

Because of the institutional context in Brazil, we have more detailed information than the one used by Gabaix and Koijen (2022) for the U.S. This is due to a larger number of funds, higher reporting frequency, the types of securities covered, and information being available at the individual fund-level rather than at the fund-family level. In the U.S., only institutional investment managers managing $100 million or more must report their holdings. The reporting frequency is quarterly, made through form 13F. Only long positions held on eligible 13F securities have to be reported. The list of eligible 13F securities comprises stocks (including units and ADRs), single-stock options (calls and puts), ETFs, and convertible notes. Moreover, the reporting is made at the asset manager level. That is, the reporting is made after the aggregation of all accounts over which an asset manager exercises investment discretion. The aggregation generates a fund-security position in form 13F. In our case, each fund is required to report holdings monthly, even if the same asset manager manages two funds for the same institution.

Our initial sample contains 1,872 investable open-ended funds between January 2005 and June 2022. It is unaffected by survivorship bias. We restrict the sample by removing all Funds-of-Funds (FoF) so that we only include those that invest directly in equity. We also exclude funds with less than two thirds of their total assets invested in equity. We exclude all funds with zero net flows during our time window. We also obtain from the Brazilian SEC information on fund flows, with the exact amount invested and withdrawn from a fund in a given month. In summary, we create a dataset with portfolio holdings and fund flows data for each individual fund at the monthly frequency, covering the period from Jan 2005 to Jun 2022. Our dataset identifies the net position on security i in month t by fund j. Our final

[2]The detailed information on fixed-income securities will be explored in further research.

dataset contains data on 42 million rows, with 20 different fields, with a total of 841 million data points.

We additionally use data from Refinitiv on monthly returns for Ibovespa, the main stock market benchmark index in Brazil; from IBGE (the National Statistics Office of Brazil) on the seasonally-adjusted monthly percentage change in industrial production; and from Bloomberg on the five-year credit default swap spreads for the sovereign debt of Brazil.

4.1 Descriptive statistics

After applying the filters above, we are left with 740 unique equity funds that collectively have \$36 billion in total net assets (TNA), which represents 60% of all equity funds. In table 1 we report descriptive monthly statistics for our funds. There is a large skewness in the distribution of fund size. The largest fund has \$1.2 billion in TNA, whereas the average fund manages only \$60 million as of January 2022. Furthermore, funds have on average 45 stocks in their portfolios. To put this in perspective, the Ibovespa index is comprised of about 60 stocks. The mean number of stocks held by funds in Brazil is almost half the number found by Koijen and Yogo (2019) for the U.S. mutual fund industry.

Our data allow us to identify positions in assets other than stocks. For instance, we find limited use of derivatives, with just five different contracts held on average each month (e.g., index futures, forward contracts, and index options). The limited use of derivatives might be explained by regulations, as CVM requires funds to state in their bylaws whether using derivatives is permitted or not, leaving little room for discretion. On the right tail of the distribution, the 90th percentile shows that a few funds make intensive use of derivatives and have expanded their equity investments well beyond the Ibovespa stocks.

Similarly, we can also observe funds' allocation to cash and equivalents. This is another advantage of our data relative to the one used by Koijen and Yogo (2019) and Gabaix and Koijen (2022), who cannot observe cash and bond positions because these securities are not eligible for mandatory disclosure in the 13F fillings.

In table 2, we see that funds on average keep a small proportion of their assets in cash and government bonds, although some funds have more than 20% of their assets in cash. The regulatory requirement that mutual funds manage their liquidity risk can be used to explain a minimum level of cash. Mutual fund managers must define liquidity management policies and thresholds according to CVM regulations and ANBIMA guidelines. These policies include periodic stress testing for both liabilities and assets. In summary, the need to preserve cash can potentially create frictions that may support the inelastic market hypothesis proposed by Gabaix and Koijen (2022). That is, as funds have to maintain a minimum position of liquid securities, they may not be able to change their holdings instantaneously after a shock. This constrained movement of holdings decrease market elasticity.

A common characteristic present in almost all equity funds is the low turnover of government bonds. This is reflected by the proximity of the average and the 90^{th} percentile. This behaviour might be explained by the historically high interest rates in Brazil, which favours holding government bonds until maturity.

Table 3 shows descriptive statistics on the average equity share and net inflows of all mutual funds in our sample. The average value-weighted average equity share is close to 90%, which is significantly higher than the regulatory floor demanded of equity funds. Figure 2a shows that the proportion invested in stocks[3] fluctuates over time around the average value of 90%. In comparative terms, this pattern is in line with the Gabaix and Koijen (2022) for the mutual fund industry in the U.S.

Figure 2b shows the average ratio of net inflows to total net assets. Different from what is widely used in the literature, we can observe directly the amount invested and withdrawn from fund i over month t. We then aggregate across all funds and show the ratio on a monthly basis. In general, we observe more inflows than outflows, with the two peaks coinciding with the period when Ibovespa reached its highest value. For instance, July/2007 and Jan/2020 are the months in which the average net inflow ratio reached its highest levels, breaking through the 20% mark. This noticeable increase in inflows is close to the periods when the Ibovespa hits its all-time highs. For example, the index surpassed the mark of 65,000 points for the first time in October 2007 and its 115,000-point mark in January 2019.

[3]The list of eligible assets for our estimation is shown in Table 9.

Table 4 shows the summary statistics for the Ibovespa index returns, the seasonally-adjusted monthly percentage change in industrial production, the five-year credit default swap spread, the value-weighted net flow of money for funds in our final sample, and the value for the instrument used in granular instrumental variables estimation.

5 Empirical Methodology and Results

Our goal is to estimate the supply and demand elasticities of net flows into equity markets.[4] We start with a flow demand-shift equation,

$$\Delta f_{it} = \phi^d Ret_{Ibov,t} + \lambda_i \eta_t + u_{it}, \tag{1}$$

and a flow supply-shift equation

$$s_t = \phi^s Ret_{Ibov,t} + \epsilon_t, \tag{2}$$

where Δf_{it} is defined as the net inflow to fund i between months *t-1* and t as a percentage of its month *t-1*'s TNA, $Ret_{IBov,t}$ is the monthly return between months *t-1* and t of the Ibovespa index, η_t is a vector of common shocks, vector λ_i is fund i's sensitivity to the common shocks, u_{it} is the idiosyncratic demand shock by fund i, s_t is the flow supply shift and ϵ_t is a supply shock. The parameters of interest are the flow demand-elasticity (ϕ^d) and the flow supply-elasticity ϕ^s.

Next, we compute the aggregate size-weighted average demand disturbance (Δf_t^{VW}) as the value-weighted aggregate net inflows between the months *t-1* and t of the Brazilian equity mutual fund flow industry. Each fund has a weight equal to the nominal value invested in stocks by the fund, measured by the multiplication of the fund's stock share in stocks $\theta_{i,t-1}$ and the fund's assets under management W_{t-1}, as a fraction of the total nominal value invested in stocks by all funds, defined as follows:

[4] In this section, we borrow the simple demand/supply model from the May 2022 version of Gabaix and Koijen (2021), section 2.

$$\Delta f_t^{VW} = \frac{\sum_i \theta_{i,t-1} W_{t-1} \Delta f_{i,t}}{\sum_i \theta_{i,t-1} W_{t-1}} = \sum_i S_i \Delta f_{i,t}, \tag{3}$$

where $S_i = \frac{\theta_{i,t-1} W_{t-1}}{\sum_i \theta_{i,t-1} W_{t-1}}$

We now equate demand to supply, or $\Delta f_t^{VW} = s_t$ and solve for $Ret_{IBov,t}$:

$$\sum_i S_i(\phi^d Ret_{Ibov,t} + \lambda_i \eta_t + u_{it}) = \phi^s Ret_{Ibov,t} + \epsilon_t$$

$$\phi^d Ret_{Ibov,t} + \lambda_S \eta_t + u_{S_t} = \phi^s Ret_{Ibov,t} + \epsilon_t,$$

where $\lambda_S = \sum_i S_i \lambda_i$ and the aggregate demand shock $u_{S_t} = \sum_i S_i u_{it}$. Solving for $Ret_{Ibov,t}$, we find:

$$Ret_{Ibov,t} = \frac{u_{S_t} + \lambda_S \eta_t - \epsilon_t}{\phi^s - \phi^d} = \mu u_{S_t} + \epsilon_t^p,$$

where $\mu = \frac{1}{\phi^s - \phi^d}$ is the price impact of the aggregate demand shock u_{S_t} and $\epsilon_t^p = \frac{\lambda_S \eta_t - \epsilon_t}{\phi^s - \phi^d}$ is the aggregate supply shock.

The equilibrium flow is thus:

$$s_t = \Delta f_t^{VW} = \phi^s Ret_{Ibov,t} + \epsilon_t = \frac{\phi^s u_{S_t} + \phi^s \lambda_S \eta_t - \phi^d \epsilon_t}{\phi^s - \phi^d} = M u_{S_t} + \epsilon_t^s,$$

where the multiplier $M = \frac{\phi^s}{\phi^s - \phi^d}$ is the quantity impact of the aggregate demand shock u_{S_t} and $\epsilon_t^s = \frac{\phi^s \lambda_S \eta_t - \phi^d \epsilon_t}{\phi^s - \phi^d}$ is the aggregate supply shock.

Our goal is to estimate the elasticities ϕ^s and ϕ^d, along with μ and M, to infer that a 1% demand shock leads to a μ% price increase and an M% supply increase.

Ideally, we would like to estimate the elasticities by running OLS regressions of the demand equation (i.e., equation (1) and the supply equation (2). However, this is not possible, as it is usually the case that the supply shock ϵ_t and the demand shock u_{it} are correlated with $Ret_{Ibov,t}$.

Intuitively, if stock returns $Ret_{Ibov,t}$ are higher, this will attract more retail investors and drive up net inflows Δf_t^{VW} to equity funds. Along the same lines, if there is a positive shock to net inflows Δf_t^{VW}, fund managers will expand their stock positions, leading to higher stock returns $Ret_{Ibov,t}$.

Therefore, we need an instrument to consistently estimate the parameters above. This is described in Section 5.1.

5.1 A Granular Instrumental Variable Methodology

To properly estimate the supply and demand elasticity parameters, ϕ^s and ϕ^d respectively, we use the granular instrumental variable (GIV) methodology proposed by Gabaix and Koijen (2021). The granular nature of our fund-level with holdings dataset allows for the construction of the GIV, which uses the funds' demand shocks u_{it} as the instruments. We assume that the u_{it} shocks are idiosyncratic and uncorrelated with the common shocks (η_t, ϵ_t)

$$E[u_{it}(\eta_t, \epsilon_t)'] = 0 \tag{4}$$

Intuitively, idiosyncratic demand shocks u_{it} to large mutual funds are fed into the aggregate demand shock u_{S_t} as exogenous shocks to the aggregate net inflows Δf_t^{VW} into the Brazilian fund equity industry.

Furthermore, we assume a simple structure where we have only a common "time-fixed effect" across funds: $\lambda_i \eta_t = \eta_t$. In this case, we can recover the idiosyncratic shocks u_{it} by using the following GIV z_t:[5]

$$z_t = \Delta f_t^{VW} - \Delta f_t^{EW} = u_{S_t} - u_{E_t}, \tag{5}$$

where the average net inflow Δf_t^{EW} is given by $\frac{\sum_i \Delta f_{i,t}}{N}$, the size-weighted idiosyncratic demand shock u_{S_t} is defined as $\sum_i S_i u_{it}$, and the equally-weighted idiosyncratic demand shock is defined as $u_{E_t} = \frac{\sum_i u_{it}}{N}$.

[5] From the demand equation (1), we have that $\Delta f_{it} = \eta_t + u_{it}$, hence $\Delta f_t^{VW} = \eta_t + u_{S_t}$ and $\Delta f_t^{EW} = \eta_t + u_{E_t}$. Hence, the common terms cancel out and we are left with the identity in equation (5).

We now show that the GIV z_t is indeed a valid instrument. First, we can see from equation (5) that z_t is a linear combination of the idiosyncratic shocks. Hence, from equation (4), the GIV z_t satisfies the exogeneity condition:

$$\textbf{Exogeneity Condition}: E[(\eta_t, \epsilon_t) z_t] = 0. \tag{6}$$

The relevance condition trivially holds, as the demand shock u_{it} is correlated with $Ret_{Ibov,t}$:

$$\textbf{Relevance}: E[Ret_{Ibov,t} z_t] \neq 0. \tag{7}$$

Now that we have shown that z_t is an instrument, we can use it to recover ϕ^s, the supply elasticity. We know from equation (2) that $s_t = \phi^s Ret_{Ibov,t} + \epsilon_t$ and from equation (4) that $E[u_t \epsilon_t] = 0$. Hence,

$$E[(s_t - \phi^s Ret_{Ibov,t}) z_t] = 0, \tag{8}$$

which implies that

$$\phi^s = \frac{E[s_t z_t]}{E[p_t z_t]}. \tag{9}$$

In equilibrium, we have that $s_t = \Delta f_t^{VW}$. Therefore,

$$\phi^s = \frac{E[\Delta f_t^{VW} z_t]}{E[p_t z_t]}. \tag{10}$$

We can proceed in an analogous way to recover the demand elasticity ϕ^d by using the fact that $E[u_{E_t} u_{S_t}] = 0$. From the demand equation (1), we have that $\Delta f_t^{EW} - \phi^d Ret_{Ibov,t} = \eta_t + u_{E_t}$, which implies that

$$E[(\Delta f_t^{EW} - \phi^d Ret_{Ibov,t}) z_t] = 0, \tag{11}$$

and so that

$$\phi^d = \frac{E[\Delta f_t^{EW} z_t]}{E[p_t z_t]}. \tag{12}$$

Note that equations (10) and (12) are the two-stage least squares estimators for the supply elasticity ϕ_s and the demand elasticity ϕ_d, respectively. We use these equations to implement the two-stage least squares regressions as follows.

For the estimation of the supply elasticity ϕ_s (equation (10)), we run an IV regression of value-weighted net inflow variable (Δf_t^{VW}) on the Ibovespa returns ($Ret_{Ibov,t}$), instrumented by the GIV z_t. Hence, on the first stage, we regress the Ibovespa returns ($Ret_{Ibov,t}$) on the GIV z_t:

$$\textbf{First-stage Supply: } Ret_{Ibov,t} = \alpha + \mu z_t + \epsilon_t^p. \tag{13}$$

In the second stage, we run the value-weighted net flow (Δf_t^{VW}) on the predicted Ibovespa returns ($\widehat{Ret}_{Ibov,t}$) from the first-stage:

$$\textbf{Second-stage Supply: } \Delta f_t^{VW} = \alpha + \phi_s \widehat{Ret}_{Ibov,t} + \epsilon_t^{yS}. \tag{14}$$

The supply elasticity GIV regressions, along with OLS and reduced-form specifications, are shown on table 5.

For estimation of the demand elasticity ϕ_d (equation (12)), we run an IV regression of equally-weighted net inflow (Δf_t^{EW}) on the Ibovespa returns ($Ret_{Ibov,t}$), instrumented by the GIV z_t. Hence, in the first-stage, we regress the Ibovespa returns ($Ret_{Ibov,t}$) on the the GIV z_t:

$$\textbf{First-stage Demand: } Ret_{Ibov,t} = \alpha + \mu z_t + \epsilon_t^p. \tag{15}$$

In the second stage, we run the equally-weighted net flow (Δf_t^{EW}) on the predicted Ibovespa returns ($\widehat{Ret}_{Ibovespa,t}$) from the first stage:

$$\textbf{Second-stage Demand: } \Delta f_t^{EW} = \alpha + \phi_d \widehat{Ret}_{Ibovespa,t} + \epsilon_t^{y_E}. \tag{16}$$

We run the supply elasticity GIV regressions, along with OLS and reduced form specifications and show results on table 6. Note that both first-stage equations 13 and 15 are equal and that the estimated coefficient $\hat{\mu} = \frac{1}{\phi^s - \phi^d}$.

One could also estimate $\hat{M} = \frac{\phi^s}{\phi^s - \phi^d}$, by running the OLS regression reduced-form for the IV supply estimation

$$\Delta f_t^{VW} = \alpha + M z_t + \epsilon_t^s. \tag{17}$$

Alternatively, the supply elasticity ϕ_s and the demand elasticity ϕ_d could be recovered, respectively, by estimating $\hat{\mu}$ and $\hat{M}$ by using the first-stage regressions (equations 13 or 15) and running an OLS regression with the equation (17).

5.2 Elasticity Estimates: Evidence from mutual fund flows

We now report our estimates for the macro-elasticity of the stock market prices to shocks to mutual funds' net flows. Table 5 shows the supply elasticity estimates for three alternative specifications. Columns (1)-(2) estimate equation (14) using standard OLS. Column (1) shows that value-weighted net flows are positively related to stock market returns, but the coefficient is not statistically significant. In column (2), we add the monthly change of the seasonally-adjusted Brazilian industrial production and the five-year credit swap spread of the Brazilian sovereign, but net flows are still not statistically significant.

These regressions are affected by endogeneity since prices and quantities are jointly determined. In columns (3)-(8) we implement the GIV methodology proposed by Gabaix and Koijen (2021). In column (3), we find that the reduced-form estimate of the value-weighted net flows on the GIV is equal to -0.798. Note that $\hat{M} = \frac{\phi^s}{\phi^s - \phi^d}$ (see equation 17). Column (4) adds the controls to the reduced-form specification. Column (5) reports the first-stage estimate from equation (13), which shows that the instrument (i.e., the variable GIV) has a negative and statistically significant effect on value-weighted net flows. Note that the estimated significant coefficient of -0.523 is equal to $\hat{\mu} = \frac{1}{\phi^s - \phi^d}$. In column (6), we report the estimation of the second-stage equation defined in equation (14), finding a positive and significant relationship between market returns and the instrumented net flows equal to 1.526. This means that a 1% demand shock to the equity inflow of funds leads to a $\mu = 0.523\%$ stock price increase and an $M = 0.798\%$ flow increase, consistent with inelastic supply and demand curves.[6] Finally, in columns (7)-(8), we find that the results are robust to adding monthly changes in industrial production and the Brazilian CDS spread.

[6] One can check that the estimated $\hat{M}$ at 0.798 is indeed equal to $\frac{\phi^s}{\phi^s - \phi^d} = \frac{1.526}{1.526 - 3.436}$. Likewise, the estimated μ at 0.523 is indeed equal to $\frac{1}{\phi^s - \phi^d} = \frac{1}{1.526 - 3.436}$.

Next, we estimate the macro-elasticity of demand, with results shown in Table 6. In this case, as described in equation (16), the dependent variable that allows us to identify the demand elasticity is the equal-weighted net inflow (Δf_t^{EW}). We find that demand elasticities are more than twice as large as supply elasticities. For example, in column (6) we find that the demand-elasticity is equal to 3.439.

As a robustness test, we also compute the instrument using only common and preferred shares and then re-estimate the OLS and IV regressions. In table 7, we can see that the estimated parameters are qualitatively similar to the ones estimated in table 5. The main difference is a slightly lower implied estimated elasticity (as the estimated multiplier is slightly higher), suggesting that the funds in our sample might have a tighter mandate to a smaller set of stocks. All in all, both tables lead to the conclusion that the demand and supply curves for the Brazilian stock market index are inelastic.

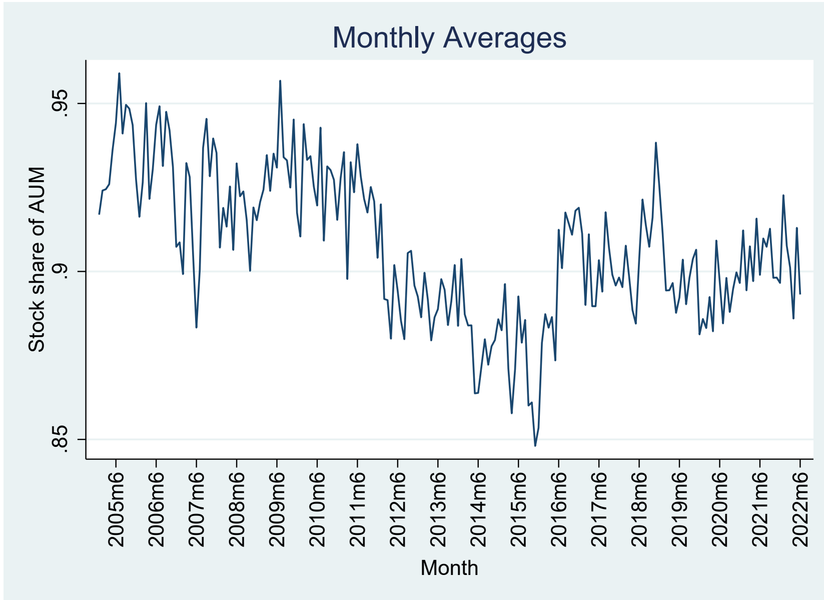
6 Conclusion

Stock prices are determined by the present value of expected future cash flows. Following supply and demand shifts unrelated to valuation changes, arbitrageurs are expected to provide liquidity to satisfy demand. This should make the price elasticity of demand very high, to the order of 5,000 or above (Petajisto (2009)). These values are compatible with small changes in returns following unexpected flows into financial markets.

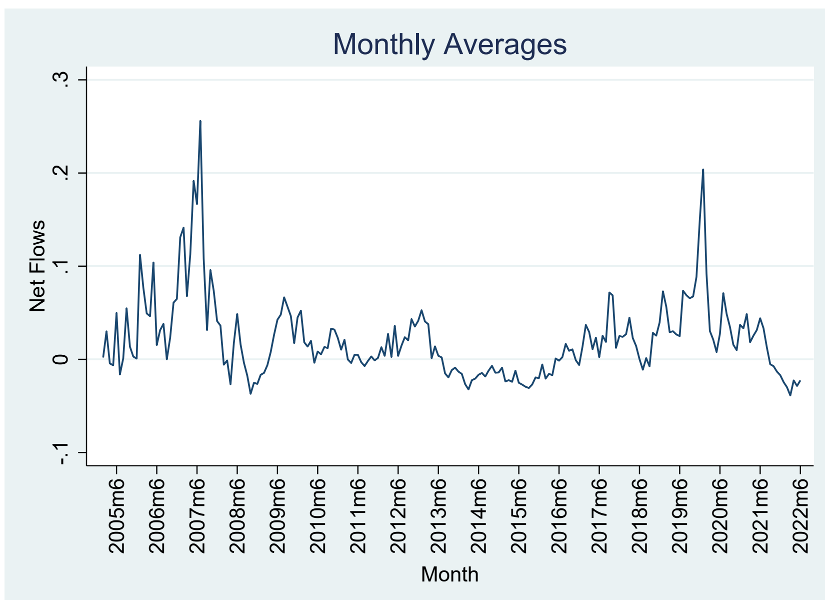
In this paper, we take advantage of a dataset of monthly portfolio holdings of mutual funds to estimate the supply and demand elasticities of equity fund flows to stock market index prices. Our data contain monthly information on portfolio holdings and flows for all investment funds in Brazil between January 2005 and June 2022. We can uniquely identify a fund by its tax identification number and observe all types of securities held by a fund. The different securities include equity as well as bonds and derivatives.

We use the framework of the granular instrument variables (GIV) proposed by Gabaix and Koijen (2021) and estimate a supply elasticity of 1.5 and a demand elasticity of 3.4. Contrary to standard asset pricing models, we find evidence that the stock market is substantially inelastic.

Obtaining small market elasticity implies that small flows into financial markets can increase the volatility of financial market returns. As a result, it can help explain an apparent disconnection between market fundamentals and return volatility.



(a) Share of stocks



(b) Net inflow

Figure 2. Panel A shows cross-sectional averages of stock shares: for each month, we compute the average across funds of the total Brazilian Real (R$) value invested in stocks divided by the fund's assets under management. Panel B shows cross-sectional averages of net inflows: for each month, we compute the average across funds of the total Brazilian Real (R$) value net inflow divided by the fund's total net assets.

Table 1

Descriptive Statistics: Portfolio Holdings, Total Net Assets, and Number of Funds

Descriptive statistics for equity funds in Brazil from January 2005 to January 2022. N(Holdings) denotes the number of securities held for three asset classes: Equity, Derivatives, and Government Bonds. Total Net Assets (TNA) are reported in thousands of U.S. dollars. N(Funds) report the number of funds for our final sample and the total number.

	N(Holdings)									TNA (in thousands USD)			N(Funds)	
	Equity			Derivatives			Government Bonds							
Date	Mean	90th percentile	Max	Mean	90th percentile	Max	Mean	90th percentile	Max	Mean	90th percentile	Max	Sample	All
Jan-05	37	66	224	3	5	21	2	5	10	$8,538	$23,331	$78,169	98	200
Jan-06	33	61	201	2	5	13	3	4	14	$13,289	$36,173	$101,954	107	298
Jan-07	32	62	121	3	4	45	2	5	8	$18,887	$59,588	$153,219	122	342
Jan-08	40	71	188	3	5	49	3	6	15	$41,603	$114,494	$467,093	177	482
Jan-09	35	70	163	3	5	26	2	4	12	$21,221	$55,151	$238,286	195	598
Jan-10	40	76	175	4	7	75	2	5	15	$31,594	$81,656	$333,411	215	669
Jan-11	42	77	235	5	10	126	3	5	16	$28,220	$71,867	$312,890	258	791
Jan-12	40	80	222	7	18	114	2	5	13	$22,087	$54,297	$314,689	294	874
Jan-13	42	85	170	7	18	113	3	7	10	$25,363	$71,475	$364,900	310	909
Jan-14	39	81	198	6	16	110	2	5	11	$22,561	$61,605	$273,373	322	977
Jan-15	36	72	156	5	9	93	2	4	9	$20,331	$50,255	$244,947	302	943
Jan-16	37	72	156	8	23	109	2	5	9	$14,539	$40,714	$168,573	282	851
Jan-17	39	80	175	7	17	134	2	4	11	$21,255	$66,702	$214,488	271	785
Jan-18	40	86	161	4	9	50	2	4	11	$36,262	$113,522	$337,946	272	758
Jan-19	43	94	191	6	13	148	2	5	13	$52,785	$147,217	$629,383	300	805
Jan-20	46	91	236	5	10	45	2	6	15	$102,409	$316,704	$1,270,338	370	914
Jan-21	47	100	294	5	12	98	2	4	13	$92,881	$239,202	$2,052,651	462	1,129
Jan-22	47	96	313	6	15	66	2	3	10	$77,366	$184,323	$1,644,510	463	1,370

Table 2
Descriptive Statistics: Portfolio Allocation to Cash and Corporate Bonds
Descriptive statistics for the allocation of Brazilian equity funds to cash and corporate bonds from January 2005 to January 2022.

	Cash				Corporate Bonds			
Date	Median	Mean	90th percentile	Max	Median	Mean	90th percentile	Max
Jan-05	0.010%	0.376%	0.323%	21.635%				
Jan-06	0.014%	0.457%	0.419%	17.031%				
Jan-07	0.009%	0.624%	0.827%	23.898%				
Jan-08	0.008%	0.285%	0.287%	20.915%	0.19%	0.43%	0.85%	1.01%
Jan-09	0.016%	0.406%	0.493%	27.304%	0.29%	0.33%	0.52%	0.58%
Jan-10	0.009%	0.458%	0.272%	46.683%	0.31%	0.25%	0.32%	0.32%
Jan-11	0.008%	0.397%	0.135%	35.776%	0.25%	0.42%	0.67%	0.78%
Jan-12	0.011%	0.291%	0.183%	40.116%	0.32%	0.54%	0.92%	1.07%
Jan-13	0.008%	0.230%	0.197%	28.754%	0.47%	0.75%	1.49%	1.75%
Jan-14	0.008%	0.156%	0.277%	6.383%	1.66%	1.66%	2.25%	2.40%
Jan-15	0.007%	0.406%	0.191%	28.957%	2.28%	2.28%	3.02%	3.21%
Jan-16	0.010%	0.313%	0.559%	13.847%	0.50%	0.50%	0.50%	0.50%
Jan-17	0.008%	0.201%	0.202%	11.553%	0.43%	0.43%	0.74%	0.82%
Jan-18	0.005%	0.293%	0.129%	28.118%	0.06%	0.35%	0.77%	0.95%
Jan-19	0.003%	0.329%	0.114%	32.405%	0.11%	0.34%	0.71%	0.86%
Jan-20	0.003%	0.295%	0.375%	21.371%	0.49%	0.52%	1.00%	1.13%
Jan-21	0.005%	0.386%	0.520%	17.873%	1.04%	1.00%	1.54%	4.40%
Jan-22	0.006%	0.490%	0.611%	44.778%	1.39%	2.64%	7.12%	8.60%

Table 3
Summary Statistics: Fund-month level
We use the CVM (Comissão de Valores Mobiliários) data to compute statistics for 49,112 fund-month observations for the period January 2005 to June 2022. We report *Net Flows*, defined as the monthly fund inflows minus outflows divided by the previous month's total net assets; *AUM*, or assets under management, defined as the total value in BRL Million invested by the fund; *TNA*, or total net assets, defined as the total value in BRL Million invested by the fund minus the fund's liabilities; *Equity Investment*, defined as the total value in BRL Million invested in equity by the fund; and*Equity Share of AUM* is the fund's Equity Investment divided by its AUM.

	N	Mean	Std	Min	10th	50th	90th	Max
Net Flows (%)	48,640	0.018	0.142	-1.003	-0.055	-0.005	0.100	1.796
AUM (*R$ Million*)	49,112	295.840	673.454	0.000	11.027	80.291	738.565	12,221.931
TNA (*R$ Million*)	49,112	294.893	672.021	5.000	10.976	79.688	736.758	12,198.578
Equity Investment (*R$ Million*)	49,112	257.195	569.433	0.000	9.583	70.275	655.961	10,787.755
Equity Share of AUM	49,111	0.903	0.193	0.000	0.707	0.948	0.999	2.000

Table 4
Summary Statistics: Month level
We provide aggregate flow statistics along with other variables used in our study at the month level. Our data covers 210 months from January 2005 to June 2022. We report *VW Net Flows*, or value-weighted flows, defined as $\Delta f_t^{VW} = \frac{\sum_i \theta_{i,t-1} W_{t-1} \Delta f_{i,t}}{\sum_i \theta_{i,t-1} W_{t-1}} = \sum_i S_i \Delta f_{i,t}$, where the fund's weight S_i is the fund's share of the BRL value of its equity holdings; *EW Net Flows*, or equally-weighted flows, defined as the cross-sectional monthly fund flow average; *GIV*, or generalised instrument variable (see Gabaix and Koijen (2021)), defined as the value-weighted flows minus the equally-weighted flows; *Ibov rtn*, defined as the monthly return of the Brazilian Ibovespa stock index; *Ind Prod (SA) Rtn*, defined as the monthly return of the seasonally-adjusted Brazilian Industrial Production index; and *5Y CDS Premium*, defined as the 5-year Brazilian CDS index premium.

	N	Mean	Std	Min	10th	50th	90th	Max
IBov rtn	210	.00862	.0671	-.299	-.0676	.00707	.0954	.17
Ind Prod (SA) Rtn	210	.000252	.0266	-.196	-.019	.00231	.017	.125
5Y CDS Premium	210	.0195	.0088	.00622	.011	.0172	.0322	.0495
VW netflow	209	.00612	.0274	-.0377	-.0219	-.000899	.0391	.138
EW netflows	209	.0215	.0432	-.0388	-.0224	.0135	.0688	.256
GIV	209	-.0154	.0208	-.118	-.0405	-.0107	.00433	.0173

Table 5

Main Granular IV Estimates - Supply Elasticity ϕ^s

We estimate the Ibovespa stock index supply elasticity ϕ^s to equity mutual fund net inflows using the granular instrument variables (GIV) methodology by Gabaix and Koijen (2021). We define equity from an enlarged set of 18 security types classified by the CVM and shown in table 9. The main dependent variable is the value-weighted net flow Δf_t^{VW}. In column (1), we report the OLS regression estimate of the Ibovespa monthly return $Ret_{Ibov,t}$. In column (3), we report the reduced form estimated multiplier $\hat{M} = \frac{\phi^s}{\phi^s - \phi^d}$ (see equation 17). In column (5), we report the first-stage IV regression estimate of the instrumented $Ret_{Ibov,t}$ on the GIV z_t. Note that the estimated coefficient is $\hat{\mu} = \frac{1}{\phi^s - \phi^d}$. In column (6), we report the second-stage IV regression estimate of Δf_t^{VW} on the predicted $\hat{Ret_{Ibov,t}}$. Columns (2), (4), (7) and (8) add as controls (i) the monthly return of the seasonally-adjusted industrial production and (ii) the Brazilian 5-year CDS premium. *p <.1; **p <.05; ***p <.01

	Dep var: $VW\ Netflow_t$							
	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) IV (1S)	(6) IV (2S)	(7) IV (1S)	(8) IV (2S)
IBov rtn	0.005	-0.014				1.526**		1.540*
	(0.027)	(0.025)				(0.673)		(0.870)
Ind Prod (SA) Rtn		0.029		-0.036			0.193	-0.332
		(0.041)		(0.037)			(0.175)	(0.343)
5Y CDS Premium		-1.403***		-0.827***			-0.283	-0.392
		(0.180)		(0.153)			(0.567)	(1.017)
GIV			-0.798***	-0.678***	-0.523**		-0.440*	
			(0.108)	(0.117)	(0.221)		(0.240)	
Obs	209	209	209	209	209	209	209	209
R^2	0.000	0.202	0.365	0.425	0.026	-13.831	0.033	-13.967
F	0.032	20.974	54.263	29.987	5.575	5.095	2.367	1.941

Table 6
Main Granular IV Estimates - Demand Elasticity ϕ^d
We estimate the Ibovespa stock index demand elasticity ϕ^d to equity mutual fund net inflows using the granular instrument variables (GIV) methodology by Gabaix and Koijen (2021). We define equity from an enlarged set of 18 security types classified by the CVM and shown in table 9. The main dependent variable is the equally-weighted net flow Δf_t^{EW}. In column (1), we report the OLS regression estimate of the Ibovespa monthly return $Ret_{Ibov,t}$. In column (3), we report the reduced form estimate on the GIV. In column (5), we report the first-stage IV regression estimate of the instrumented $Ret_{Ibov,t}$ on the GIV z_t. Note that the estimated coefficient is $\hat{\mu} = \frac{1}{\phi^s - \phi^d}$. In column (6), we report the second-stage IV regression estimate of Δf_t^{EW} on the predicted $\hat{Ret_{Ibov,t}}$. Columns (2), (4), (7) and (8) add as controls (i) the monthly return of the seasonally-adjusted industrial production and (ii) the Brazilian 5-year CDS premium. *p <.1; **p <.05; ***p <.01

	Dep var: $EW\ Netflow_t$							
	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) IV (1S)	(6) IV (2S)	(7) IV (1S)	(8) IV (2S)
IBov rtn	0.055	0.023				3.439**		3.811*
	(0.039)	(0.036)				(1.471)		(2.087)
Ind Prod (SA) Rtn		0.111		-0.036			0.193	-0.770
		(0.084)		(0.037)			(0.175)	(0.823)
5Y CDS Premium		-2.216***		-0.827***			-0.283	0.250
		(0.304)		(0.153)			(0.567)	(2.442)
GIV			-1.798***	-1.678***	-0.523**		-0.440*	
			(0.108)	(0.117)	(0.221)		(0.240)	
Obs	209	209	209	209	209	209	209	209
R^2	0.007	0.217	0.745	0.769	0.026	-27.491	0.033	-33.650
F	2.006	18.776	275.489	106.891	5.575	5.411	2.367	1.517

Table 7
Robustness GIV Supply Elasticity ϕ^s - Only common and preferred shares
We run robustness checks to the estimates of table 5, by using only common and preferred shares to define equity (the 2 first lines in table 9). We estimate the Ibovespa stock index supply elasticity ϕ^s to equity mutual fund net inflows using the granular instrument variables (GIV) methodology by Gabaix and Koijen (2021). The main dependent variable is the value-weighted net flow Δf_t^{VW}. In column (1), we report the OLS regression estimate of the Ibovespa monthly return $Ret_{Ibov,t}$. In column (3), we report the reduced form estimated multiplier $\hat{M} = \frac{\phi^s}{\phi^s - \phi^d}$ (see equation 17). In column (5), we report the first-stage IV regression estimate of the instrumented $Ret_{Ibov,t}$ on the GIV z_t. Note that the estimated coefficient is $\hat{\mu} = \frac{1}{\phi^s - \phi^d}$. In column (6), we report the second-stage IV regression estimate of Δf_t^{VW} on the predicted $\widehat{Ret_{Ibov,t}}$. Columns (2), (4), (7) and (8) add as controls (i) the monthly return of the seasonally-adjusted industrial production and (ii) the Brazilian 5-year CDS premium. *p <.1; **p <.05; ***p <.01

	Dep var: $VW\ Netflow_t$							
	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) IV (1S)	(6) IV (2S)	(7) IV (1S)	(8) IV (2S)
IBov rtn	0.004	-0.016				1.456**		1.404*
	(0.028)	(0.026)				(0.653)		(0.790)
Ind Prod(SA) Rtn		0.043		-0.001			0.204	-0.287
		(0.039)		(0.042)			(0.174)	(0.315)
5Y CDS Premium		-1.416***		-0.906***			-0.295	-0.492
		(0.193)		(0.175)			(0.564)	(0.934)
GIV			-0.768***	-0.632***	-0.528**		-0.450*	
			(0.115)	(0.128)	(0.226)		(0.242)	
Obs	209	209	209	209	209	209	209	209
R^2	0.000	0.190	0.297	0.364	0.026	-11.485	0.034	-10.606
F	0.020	19.630	44.260	25.678	5.461	4.921	2.401	2.141

Table 8
Robustness: GIV Demand Elasticity ϕ^d - Only common and preferred shares
We run robustness checks to the estimates of table 6, by using only common and preferred shares to define equity (the 2 first lines in table 9). We estimate the Ibovespa stock index demand elasticity ϕ^d to equity mutual fund net inflows using the granular instrument variables (GIV) methodology by Gabaix and Koijen (2021). We define equity from an enlarged set of 18 security types classified by the CVM and shown in table 9. The main dependent variable is the equally-weighted net flow Δf_t^{EW}. In column (1), we report the OLS regression estimate of the Ibovespa monthly return $Ret_{Ibov,t}$. In column (3), we report the reduced form estimate on the GIV. In column (5), we report the first-stage IV regression estimate of the instrumented $Ret_{Ibov,t}$ on the GIV z_t. Note that the estimated coefficient is $\hat{\mu} = \frac{1}{\phi^s - \phi^d}$. In column (6), we report the second-stage IV regression estimate of Δf_t^{EW} on the predicted $\hat{Ret_{Ibov,t}}$. Columns (2), (4), (7) and (8) add as controls (i) the monthly return of the seasonally-adjusted industrial production and (ii) the Brazilian 5-year CDS premium. *p <.1; **p <.05; ***p <.01

	Dep var: $EW\ Netflow_t$							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	OLS	OLS	OLS	IV (1S)	IV (2S)	IV (1S)	IV (2S)
IBov rtn	0.053	0.021				3.351**		3.625*
	(0.038)	(0.036)				(1.450)		(1.959)
Ind Prod(SA) Rtn		0.099		-0.001			0.204	-0.739
		(0.086)		(0.042)			(0.174)	(0.780)
5Y CDS Premium		-2.182***		-0.906***			-0.295	0.164
		(0.304)		(0.175)			(0.564)	(2.316)
GIV			-1.768***	-1.632***	-0.528**		-0.450*	
			(0.115)	(0.128)	(0.226)		(0.242)	
Obs	209	209	209	209	209	209	209	209
R^2	0.007	0.208	0.691	0.720	0.026	-26.039	0.034	-30.341
F	1.909	17.965	234.517	89.652	5.461	5.290	2.401	1.571

Table 9
Eligible Securities
This table describes the different types of equity securities used in the estimation of macro-elasticity. SDC: Securities Deposit Certificate. N(securities) is the number of unique securities present in our final sample in June 2022.

Class	Asset	Nature	N(Securities)	Amount (in USD)
Stock	Common	Available-for-sale	414	$ 20,903,372,536
Stock	Preferred	Available-for-sale	101	$ 4,778,153,843
Stock	Common	Security Loan	206	$ 1,843,757,077
Stock	Preferred	Security Loan	29	$ 339,090,325
BDR	Level I	Available-for-sale	278	$ 259,468,591
BDR	Level II	Available-for-sale	-	-
BDR	Level III	Available-for-sale	12	$ 64,078,875
BDR	Unsponsored	Available-for-sale	250	$ 242,855,949
BDR	ETF	Available-for-sale	2	$ 12,281,764
BDR	Level I	Security Loan	1	$ 422,236
BDR	Level II	Security Loan	-	-
BDR	Level III	Security Loan	1	$ 219,031
BDR	Unsponsored	Security Loan	-	-
UNITS	SDC	Available-for-sale	50	$ 1,550,240,556
UNITS	SDC	Security Loan	14	$ 94,891,506
Stock	Subscription Receipts	Security Loan	1	$ 54
Stock	Bonus Issue	Security Loan	-	-
Total				$ 30,088,832,343

References

Ben-David, I., Franzoni, F., and Moussawi, R. (2018). Do etfs increase volatility? *The Journal of Finance*, 73(6):2471–2535.

Camanho, N., Hau, H., and Rey, H. (2022). Global Portfolio Rebalancing and Exchange Rates. *The Review of Financial Studies*, 35(11):5228–5274.

Chang, Y.-C., Hong, H., and Liskovich, I. (2015). Regression discontinuity and the price effects of stock market indexing. *Review of Financial Studies*, 28(1):212–246.

De Long, J. B., Shleifer, A., Summers, L. H., and Waldmann, R. J. (1990). Noise trader risk in financial markets. *Journal of Political Economy*, 98(4):703–738.

Gabaix, X. (2011). The granular origins of aggregate fluctuations. *Econometrica*, 79(3):733–772.

Gabaix, X. and Koijen, R. S. J. (2021). Granular instrumental variables. Working paper, University of Chicago.

Gabaix, X. and Koijen, R. S. J. (2022). In search of the origins of financial fluctuations: The inelastic markets hypothesis. Working paper, University of Chicago.

Grossman, S. J. and Stiglitz, J. E. (1980). On the impossibility of informationally efficient markets. *The American Economic Review*, 70(3):393–408.

Koijen, R. S. and Yogo, M. (2019). A demand system approach to asset pricing. *Journal of Political Economy*, 127(4):1475–1515.

Lou, D. (2012). A Flow-Based Explanation for Return Predictability. *The Review of Financial Studies*, 25(12):3457–3489.

Mehra, R. and Prescott, E. C. (1985). The equity premium: A puzzle. *Journal of Monetary Economics*, 15(2):145–161.

Modigliani, F. and Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. *The American Economic Review*, 48(3):261–297.

Peng, C. and Wang, C. (2023). Factor demand and factor returns. Working paper, London School of Economics.

Petajisto, A. (2009). Why do demand curves for stocks slope down? *The Journal of Financial and Quantitative Analysis*, 44(5):1013–1044.

Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *Journal of Finance*, 19(3):425–442.

Shleifer, A. (1986). Do demand curves for stocks slope down? *The Journal of Finance*, 41(3):579–590.

Wurgler, J. and Zhuravskaya, E. (2002). Does arbitrage flatten demand curves for stocks? *The Journal of Business*, 75(4):583–608.