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Jonas Hjort

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Centre for Economic Policy Research
33 Great Sutton Street, London EC1V 0DX, UK
Tel: +44 (0)20 7183 8801
www.cepr.org

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Jonas Hjort - hjort@columbia.edu
Columbia University and CEPR

Ethnic Investing and the Value of Firms*

Jonas Hjort
Columbia University
& BREAD & CEPR
& NBER

Changcheng Song
Singapore Management
University

Christopher Yenkey
University of
South Carolina

June 29, 2021

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1 Introduction

Individuals, regions, and nations tend to invest much more in others to which they are linked through ethnic ties.[1] This may be due to information asymmetries arising, for example, from easier communication or screening among coethnics, in which case investors will tend to earn higher returns on coethnic investments (Lang, 1986; Greif, 1993; Cornell & Welch, 1996; Fisman *et al.* , 2017). Alternatively, investors may have a taste for—or a psychological or social bias towards—investing in coethnics, in which case they will tend to earn lower returns on coethnic investments (Becker, 1957; Hjort, 2014; Fisman *et al.* , 2020). Individual investors' differential returns on coethnic investments can therefore help identify the underlying source of investor biases.

The *aggregate* economic consequences of coethnic investing likely depend on the nature and magnitude of these biases. Market-wide impacts have interested economists at least since Banerjee & Munshi (2004) showed evidence that ethnic-majority firms benefit from easier access to capital. But how coethnic investing affects overall value creation is unusually difficult to estimate. There are several reasons for this. A salient one is that aggregate impacts depend also on market responses to favoritism (Becker, 1957; Arrow, 1973; Shleifer & Summers, 1990; Shleifer & Vishny, 1997; Van Nieuwerburgh & Veldkamp, 2009).

In this paper we study the extent, nature, and aggregate consequences of coethnic investing in Kenya. To do so, we use complete 2006-2010 transaction level data from the Nairobi Securities Exchange (NSE). Exploiting both cross-sectional variation and an unusual feature of the context we study—some firms "change ethnicity" as a consequence of management turnover—we first show that a *given Kenyan investor* invests considerably more *in a given firm* when its CEO and/or board is of the same ethnicity as the investor, and earns lower risk-adjusted returns as a result. We use a simple model to show why such investor taste for or bias towards coethnic firms in effect "misallocates demand" across firms. In the model, both supply-side responses and demand-side responses can counteract coethnic investing. Taking advantage of the complete market nature of the NSE, we show evidence consistent with these predictions, but also that market responses far from offset the impact on firms' combined value.

The Kenyan stock market is an ideal setting to study cothnic investing. First, ethnic

[1] See, among many others, Fafchamps (2000); Rauch (2001); Banerjee & Munshi (2004); Guiso *et al.* (2009); Hjort (2014); Burgess *et al.* (2015); Beach & Jones (2017); Fisman *et al.* (2017); Burchardi *et al.* (2019); Fisman *et al.* (2020).

divisions are salient in Kenyan society (Ndegwa, 1997; Barkan, 2004; Berge *et al.* , 2020). Second, some investment objects—in our context, large firms—in effect change ethnicity across time in Kenya, and we observe the investment behavior of tens of thousands of ethnically identifiable individual investors. This means that we can estimate how coethnicity affects investment *within investor-investment object pairs*, which has not been possible to do in existing research (see also Bertrand & Mullainathan, 2004). Third, since we study "atomistic" investors whose returns are observed, we can distinguish returns-increasing and -decreasing sources of discrimination.[2] It is hard to imagine settings in which researchers can more confidently rule out unobserved, pecuniary dimensions of returns than among retail stock market investors. Finally, and most importantly, observing all firms and investors in the market allows us to study forces counteracting coethnic investing and the ultimate impact market-wide—aggregate phenomena that are difficult to get at in partial samples.

We start our analysis by documenting a positive and large coethnicity effect in investment decisions. To do so, we first regress measures of an investor's investments in a given firm on measures of the firm's CEO and/or board belonging to the same ethnicity as the investor in the month in question, controlling for month, investor, and firm (or, alternatively, investor-firm) fixed effects. We show that the particular parallel trends assumption required to interpret the estimate causally appears to hold.[3]

To investigate *why* investors invest more in coethnic firms, we show that the risk-adjusted return on such investments is on average lower. This suggests that coethnic investing in Kenya is primarily explained by investor preferences or biases[4]—knowledge that in turn means that we can use economic theory to predict market responses and aggregate impacts.

We do so with a simple model inspired by Merton (1987). The model illustrates that preference- or bias-driven coethnic investing is expected to misallocate demand relative to a counterfactual scenario in which all investors are neutral. But the model also predicts that supply- and demand-side market participants—firms themselves through

[2]The largest holding we observe is an investor owning 2.88 percent of a firm. The mean and median of the share of firms owned by each of their 10 largest individual Kenyan shareholders is 0.20 and 0.05 percent in our data.

[3]That is, the times when firms switch to management of another ethnicity are not times when investment from "post-coethnics" (or "pre-coethnics") are trending up/down, relative to investment from other investors.

[4]Investor psychological biases—and related social phenomena such as e.g. herd behavior or peer pressure—may also contribute to the form of coethnic investing we identify. Like Becker (1957)-style taste-based discrimination, these generally predict lower financial returns for investors and in aggregate adverse consequences for *firms*, the focus of this paper.

their choice of (CEO) ethnicity, and neutral investors—can benefit from counteracting coethnic investing. Such responses reduce the expected impact on the average value of firms by partially or fully equating demand for and supply of each type of firm (Becker, 1957; Shleifer & Vishny, 1997). The ultimate impact is an empirical question.

In the final part of the paper, we show evidence suggesting that coethnic investing markedly lowers firms' average value in Kenya. We test the model's predictions in three different ways. In the first of two approaches exploiting demand-side variation, we measure a firm's "coethnic (potential) investor base" as the *proportion* of portfolio wealth held by active investors in the market that belongs to the same ethnic group as the firm's CEO. We find that, when a firm's coethnic investor base increases—controlling for the firm and month—the price-to-book value of the firm also increases, and vice versa. In the second demand-side approach, we use foreign and institutional investors as a proxy for neutral investors. We find that firm values are higher when the proportion of (portfolio wealth held by) active investors that are neutral is higher. Individual firms on average benefit less from a bigger neutral investor base than a proportionately bigger coethnic investor base, but importantly minority-ethnicity firms benefit more from neutral investors than majority-ethnicity firms do. These results support a neutral-investors-as-arbitrageurs intuition captured in the model, and offer a natural way to distinguish investor favoritism from demand itself.

A sharper form of variation arises on the market's supply-side when a change in "firm ethnicity" resulting from CEO turnover changes a firm's coethnic investor base from one ethnic group to another from one month to the next. We find that, when a firm's coethnic investor base abruptly increases in this way, the firm's price-to-book value also increases. In contrast, when the firm's coethnic investor base abruptly decreases because of a change in CEO ethnicity, the firm's value also decreases.[5]

These results imply that demand- and supply-side forces counteract but do not offset the impact of coethnic investing on the value of Kenyan firms. One of our back-of-the-envelope calculations for example suggest that the total value of the firms listed on Kenya's stock exchange would be 37 percent (or USD 5.23 billion in 2010) higher if the proportion of neutral investors in the market was equal to one-half rather than the monthly average of 4.2 percent.

[5]We do not find evidence of changes in a firm's ethnicity affecting *other* firms' stock market valuations—perhaps in part because each firm is small relative to the market as a whole—but the sample we analyze is too small to estimate such spillover effects precisely.

This paper studies how discrimination manifests itself in a market. Economists have long been interested in the possibility of market-wide economic costs of discrimination (Becker, 1957; Arrow, 1973; Phelps, 1972; Banerjee & Munshi, 2004), but empirical estimates have remained elusive.[6] The primary reason is that market responses both complicate identification of the phenomenon itself, and are difficult to account for as mediators of aggregate impacts. We analyze a complete market; wherein a specific form of "micro" (investor×firm) level discrimination can be identified, yielding theoretical predictions for how value creation should be affected in the absence of fully compensating market responses; and in which predicted supply- and demand-side responses themselves are also observed.[7] We are therefore able to establish the dramatic extent to which coethnic investing misallocates demand across—and lowers the average value of—large, listed firms in Kenya, despite stock markets being associated with comparatively efficient capital allocation.

We also contribute to the related but distinct body of work on the relationship between ethnic ties and investment (see, among many others, Rauch & Trindade, 2002; Banerjee & Munshi, 2004; Fisman *et al.* , 2017; Burchardi *et al.* , 2019; Fisman *et al.* , 2020). We do so by exploiting changes in investment objects' ethnicity, which enables identification of the causal effect of coethnicity *holding the investor-investment object pair constant*. Existing studies estimate a different causal effect. They do so by comparing a given investor when they are "assigned" to a coethnic versus a non-coethnic investment opportunity (Hjort, 2014; Fisman *et al.* , 2017, 2020) or vice versa (Burgess *et al.* , 2015; Burchardi *et al.* , 2019). Such an approach cannot separate the effect of correlated, unobserved match characteristics from that of shared identity itself. Studying changes in coethnicity within investor-investment object pairs arguably does so.[8] In addition, we

[6] Charles & Guryan (2008) and Hsieh *et al.* (2019)'s work on U.S. labor markets are important exceptions. Hsieh *et al.* (2019) back out the change in discrimination and related frictions in the U.S. from 1960 to 2010 that can explain the observed convergence in the occupational distribution and wages of African Americans and women relative to white men, and filter the estimates through a general equilibrium model to quantify the impact on GDP that such changes may explain. Charles & Guryan (2008) show support for the predictions of Becker (1957)'s taste-based model of discrimination in data on U.S. wages and racial attitudes. They then use the model to predict how much higher Black workers' wages would be if the "marginal discriminator" among employers was less discriminatory.

[7] The existing evidence on institutional investors' role in stock markets is mixed, and comes from rich countries (see e.g. Gabaix *et al.* , 2006; Boehmer & Kelley, 2009; Campbell *et al.* , 2009; Basak & Pavlova, 2013; Edelen *et al.* , 2016). We are not aware of prior evidence from a young and comparatively small but growing market like Kenya's. Do *et al.* (2021) show compelling evidence that investors investing in firms with Jewish connections earned higher returns during a period of increased antisemitism in 19th century France.

[8] Unobserved match effects between managers and investors that are correlated with coethnicity are—even among the retail investors we focus on—a possibility, but less plausible than the match effects between investors and investment objects themselves that existing studies may capture. One reason for this is that the investors in our sample earn lower risk-adjusted returns on their coethnic investments (see also footnote 23).

analyze a type of market—stock markets—and a type of firm—large firms—on which evidence from developing countries is almost entirely absent, despite both generally being considered essential to economic growth. Around 45 developing countries have established stock exchanges during the last 30 years.[9]

Finally, this paper relates to the literature that studies the *nature* of discrimination (see, for overviews, Loury, 1998; Altonji & Blank, 1999; List & Rasul, 2011; Charles & Guryan, 2013; Bertrand & Duflo, 2017), and the parallel finance literature on "home bias" in investing (see, for overviews, Lewis, 1999; Coeurdacier & Rey, 2013; Cooper *et al.* , 2013; Ardalan, 2019).[10] We analyze a context where both individual investors and investment objects are ethnically identifiable, investors are "atomistic", and risk-adjusted returns—above and beyond taste-based and psychological rewards—are plausibly fully observed.[11] We show that, in such a context, an information asymmetry story in which investments in coethnic investment objects reap higher returns appears not to be the primary explanation underlying coethnic investing.[12] Preference or psychology-based homophily investing of the form we uncover may more generally constrain the growth of regions and firms with small or poor investor bases when counteracting market responses are limited in scope (Banerjee & Munshi, 2004; Banerjee & Duflo, 2005).

2 Background and Data

Ethnic rivalries have characterized Kenyan political and economic affairs since independence (see e.g. Ndegwa, 1997; Barkan, 2004; Dupas & Robinson, 2012; Hjort, 2014; Berge *et al.* , 2020; Jakiela & Ozier, 2019), but the Nairobi Securities Exchange (NSE)

[9] Existing work on stock markets in poor countries includes Anagol & Kim (2012); Yenkey (2015); Anagol *et al.* (2018, forthcoming); Yenkey (2018a,b). See e.g. King & Levine (1993); Rajan & Zingales (1998); Levine (2005) on the importance of stock markets and large firms.

[10] Notable studies in the latter literature include—also among many others—French & Poterba (1991); Coval & Moskowitz (1999); Huberman (2001); Van Nieuwerburgh & Veldkamp (2009); Seasholes & Zhu (2010); Hvide & Døskeland (2011); De Marco *et al.* (2020).

[11] In economics, research on discrimination began in earnest with the famous debate between Becker (1957) and Arrow (1973) over financially self-beneficial (information asymmetry-driven or "statistical") versus -costly ("taste-based") discrimination (see also Phelps, 1972; Aigner & Cain, 1977). But using this fundamental difference to tell apart motivations has rarely been possible because returns are usually unobserved. We follow a handful of studies of real markets and workplaces in doing so (Cohen *et al.* , 2008; Bandiera *et al.* , 2009; Hjort, 2014; Fisman *et al.* , 2017, 2020), as well as the finance literature that cross-sectionally compares returns on different investments. However, in settings where investors are not "atomistic", researchers may not observe all relevant dimensions of returns. For example, it may be that upstream "suppliers" in a production line who favor downstream coethnics over non-coethnics lower their own pay—as in Hjort (2014)—but are rewarded socially for doing so.

[12] In this sense coethnic investment objects command a higher willingness-to-pay from particular groups of investors like the stocks of firms that do not promote vice or funds that promise "impact" or are run by managers with American-sounding names appear to do (Hong & Kacperczyk, 2009; Kumar *et al.* , 2015; Barber *et al.* , 2021).

was effectively inaccessible to ordinary Kenyans until the 2000s. By the early 2000s, more firms sought to be listed on the NSE, and more Kenyans could afford to invest in stocks. The Privatization Act of 2005 lowered entry barriers to retail investing by digitizing the trading system and by requiring firms to make a higher proportion of newly issued shares accessible to domestic, small-scale investors via smaller lots. The number of investors on the NSE grew rapidly (Yenkey, 2015): total value traded from 2000 to 2005 was about 20 percent of that from 2006 through 2010.

Detailed information on the data we use is in Appendix A1; we now provide an overview. The version of the NSE's Transactions Registry we have access to reports the firm's ticker id, the number of shares traded, the price, the seller's (masked) id, the buyer's (masked) id, and the date for all trades that occurred on the NSE from January 1, 2006 through December 31, 2010. Short-selling was not allowed during this period.

We do not observe shares that an investor had bought before the NSE "went digital" in 2006 and did not trade thereafter. To construct a measure of an investor's portfolio, we thus assume that all investors have zero holdings as of 2006. We thereafter simply add any observed purchases to investor i's inferred holdings, and subtract any observed sales. Recall that the NSE was much less active before 2006: our results are very similar if we instead focus only on investors who opened their NSE account in 2006 or later, in which case we observe investors' full portfolio at every point in time. The fact that we do not observe pre-2005 holdings is also not relevant for the "flow" measure of coethnic investing that, as we describe in Section 3, is our preferred measure.

The version of the NSE's Investor Registry we have access to reports the investor's (masked) id, account creation year, and—crucially—last name. In addition, the names of listed firms' CEO and board-members are publicly available. Information on firms' book value, outstanding shares, etc, come from their financial statements.

Table 1 provides summary statistics on our analysis sample. We restrict attention to investors who trade (buy or sell) five or more times at least one year during our 2006 – 2010 data period. As seen in Panel A, there are about 55,000 such investors in our dataset for which we can also infer ethnicity.[13] These investors have average portfolio values of around USD 6,000 in 2006.[14] Panel B shows that 41 of the 47 firms that are observed on the NSE during our data period were listed before the stock exchange's

[13]This includes a small number of brokers and institutional investors for which we can infer the ethnicity of the individual listed as account owner.

[14]The average portfolio value is somewhat lower at the end of our data period, in part because many smaller investors joined the NSE during 2006 – 2010.

digital operations began in 2006. The firms cover a range of sectors, with 24 percent in "Commercial and Services", 31 percent in "Finance and Investment", and 36 percent "Industrial". The firms are large, with an average total market capitalization of around USD 261 million in 2006 and USD 286 million in 2010. In Panel C we see that the investor belongs to the same ethnicity as the CEO in 27 percent of investor×firm×month observations in our analysis dataset.

We probabilistically assign ethnicities to investors, CEOs, and board-members using their last names. The starting point is name×ethnicity match probability information recorded by Yenkey (2015, 2018a,b). The author hired eight Kenyan research assistants (RAs), each of whom reported if they were highly confident that a given name could belong to a given ethnicity or not.[15] There is overlap in the names used by some ethnicities so that the RAs could assign a given name to multiple ethnicities.

Using the RAs' reports, we construct four measures of an investor's ethnic proximity to a firm's CEO and board respectively. The first CEO measure, CoethnicCEO$_{ijt}$, is an indicator variable equal to one if investor i and the CEO running firm j in month t are relatively likely to belong to the same ethnicity—they share a *Likely Ethnicity* as inferred from name×ethnicity match probabilities—and relatively unlikely to belong to two different ethnicities (see Appendix A2 for details).

The second CEO measure, CEOCoethnicityIndex$_{ijt}$, is a 0 (minimum proximity) to 1 measure of the expected ethnic proximity between the investor's and the CEO's name, given each person's expected probability of belonging to each ethnicity. Specifically, the index is equal to the inner product of the investor and the CEO's name×ethnicity match probabilities. In this case we can make use of the full sample, and we avoid restricting attention to the investor's and CEO's most likely ethnicity and the judgment required to define a *Likely Ethnicity*.[16]

One board measure, BoardCoethnicityIndex$_{ijt}$, is equal to the proportion of board-members that are coethnic with the investor, where coethnicity is measured as for CoethnicCEO$_{ijt}$. The other board measure, CoethnicBoard$_{ijt}$, is a 0/1 variable, and essentially repeats the construction of CoethnicCEO$_{ijt}$ twice, first between individual board-members and the investor, then for the board as a whole vis-a-vis the in-

[15]The ethnicities the RAs were asked about, and that we observe, are Anglo, Embu, Kalenjin, Kamba, Kikuyu, Kisii, Luhya, Luo, Maasai, Meru, Somali, South Asian, and Swahili.

[16]CEOCoethnicityIndex$_{ijt}$ is "assumptions-free" in that it follows directly from the raw data from the RAs. The reason why this measure also allows us to make use of a larger part of our sample is that it does not require leaving out observations for which we cannot assign a name to a given ethnicity with confidence. CoethnicCEO$_{ijt}$ is e.g. missing if either the investor or the CEO does not have a *Likely Ethnicity*.

vestor. This is a strict measure of investor-board coethnicity in the sense that, to set $\text{CoethnicBoard}_{ijt} = 1$ in month t, we require, first, each individual board-members to be either a likely coethnic or a likely non-coethnic of the investor, and second, for the board as a whole to be relatively likely to belong to the same ethnicity as the investor and relatively unlikely to belong to another ethnicity.

In the next section we will see that all four measures of investor-firm coethnicity give similar results. Appendix A2 has more detailed information on their construction.[17]

3 Ethnic Investing in Kenya

To estimate how investor-firm coethnicity affects investment, we take avantage of two features of the context we study. First, we observe which particular investors belong to the same ethnicity as each firm's management at a given point in time. Second, when CEOs and board-members are replaced by others of another ethnicity, the coethnicity status of a given investor-firm pair changes.

We first run:

$$\text{Investment}_{ijt} = \alpha + \beta \text{CoethnicFirm}_{ijt} + \gamma_i + \delta_j + \psi_{c(jt)} + \theta_t + \varepsilon_{ijt} \tag{1}$$

where Investment_{ijt} is the value of the investment investor i holds in firm j in month t, normalized by the total value of all her investments, or firm j's "portfolio weight" in i's portfolio. In addition to month fixed effects θ_t, we also include investor, firm, and CEO ethnicity fixed effects γ_i, δ_j, and $\psi_{c(jt)}$ so that our results are not driven by differences across investors, firms, or the various ethnic groups present in our data.[18] We also control for a "value control" that is measurable in our data and that varies at the firm-month level, the return-on-equity (ROE) over the past 12 months. As discussed in Section 2, we show results for four definitions of $\text{CoethnicFirm}_{ijt}$, two measuring investor-CEO coethnicity and two measuring investor-board coethnicity. We cluster the error term ε_{ijt} at the investor level.

The portfolio weight measure of investment follows standard practice in the investor behavior literature, whose focus is generally on cross-sectional relationships (see

[17] We also show in the Appendix that our results are generally robust to an alternative way to construct the measures of ethnicity itself that enter into the construction of CoethnicCEO_{ijt}, $\text{BoardCoethnicityIndex}_{ijt}$, and $\text{CoethnicBoard}_{ijt}$ from the name×ethnicity match probability data.

[18] With firm fixed effects included, our analysis also controls for differences in firms' average market capitalization.

e.g. Cohen *et al.* , 2008; Hvide & Døskeland, 2011). However, our focus is on how coethnicity affects investment and ultimately firms themselves, and $\text{CoethnicFirm}_{ijt}$ varies across time within a given investor-firm pair. It is e.g. reasonable to expect an investor's *stock* of investment in a firm to respond only gradually after the firm "becomes coethnic" (or non-coethnic) but her investment *flows* to respond more rapidly, if she is in fact influenced by the firm's ethnicity. We thus exploit the full granularity of the NSE transactions data to construct the outcome variable $\text{OrderImbalance}_{ijt}$—the value of shares in firm j purchased by investor i in month t minus the value of shares in the firm sold by the same investor in the same month, divided by the sum of purchases and sales by i in j at t (see e.g. Chordia *et al.* , 2002).[19] We run:

$$\text{OrderImbalance}_{ijt} = \alpha + \beta\text{CoethnicFirm}_{ijt} + \gamma_i + \delta_j + \psi_{c(jt)} + \theta_t + \varepsilon_{ijt} \qquad (2)$$

The results for both approaches are shown in Table 2. As seen in the top panel, the share of an investor's investments that is held in a given firm at a given point in time is 1.8 percent higher if the firm is managed by a coethnic CEO ($\text{CoethnicCEO}_{ijt} = 1$).[20] Similarly, the fraction of her investments an investor holds in a given firm is 2 percent greater when she has maximum ethnic proximity to the firm's CEO compared to when she has minimum ethnic proximity to the firm's CEO ($\text{CEOCoethnicityIndex}_{ijt} = 1$ vs. $= 0$). Columns 3 and 4 show that the share of an investor's investments that is held in a given firm at a given point in time is 3.5 percent higher if the firm is managed by a coethnic board ($\text{CoethnicBoard}_{ijt} = 1$), and 8.5 percent greater when she has maximum ethnic proximity to the firm's board compared to when she has minimum ethnic proximity to the firm's board ($\text{BoardCoethnicityIndex}_{ijt} = 1$ vs. $= 0$).

Columns 1 and 2 of the bottom panel of Table 2 show that a given investor's normalized net investment in a given firm in a given month—investor i's $\text{OrderImbalance}_{ijt}$ for firm j in month t—is 11 percent greater if the firm is managed by a coethnic CEO in

[19] Another reason for focusing on $\text{OrderImbalance}_{ijt}$ is that, unlike Investment_{ijt}, this measure of investment decisions is not influenced by the evolution of (the values of) an investor's holdings *after* purchases are made. Note that normalizing net purchases by volume traded is standard. Doing so controls for potential liquidity differences across observations (see e.g. Chordia *et al.* , 2002).

[20] All stock market transactions have both a seller and a buyer. This raises the question of who is, on average, on the other side of the market in transactions that increase the portfolio weight of coethnic firms for a given buyer (or seller). An important part of the answer is that "ethnic concentration"—the proportion of equity held by coethnic investors—increases during our data period, implying that many such transaction partners are simply non-coethnics of the relevant CEO or board. Another contributor is that the period we study is one in which many small investors joined the stock market, buying equity from larger investors. This contributes to the estimates in Table 2 as we do not weight investors by their size.

the month in question; 18 percent greater with maximum relative to minimum ethnic proximity to the CEO; 70 percent greater if the firm is managed by a coethnic board in the month in question; and 167 percent greater with maximum relative to minimum ethnic proximity to the board.[21] In Appendix Table A1 we restrict attention to coethnic bias in investors' *buys*, ignoring their sells. The patterns are the same as those in the bottom panel of Table 2. This is unsurprising because most of the variation in $\text{OrderImbalance}_{ijt}$ comes from buys. The results are also unchanged if we exclude the largest investors in the sample, for example leaving out the 10 percent of investors with highest portfolio value, or the 10 percent biggest investors in each firm. This is also expected, as we do not weight investors by their size in this section.

The estimates in Table 2 capture a broad notion of coethnicity, in particular how "coethnicity itself" and any correlated, unobserved match characteristics of investor-firm pairs affect investment (controlling for the identity of the investor, the identity of the firm, and the ethnicity of the firm's CEO). In this sense our approach is comparable to that of existing studies of ethnic discrimination or favoritism in real markets and workplaces.[22] This is true despite regressions (1) and (2) exploiting both "cross-sectional" variation in coethnicity—loosely, comparing the investment of investors A and B in firm 1 relative to firm 2, when one investor shares an ethnicity with one of the two firms and the other with neither—and also time variation. Time variation arises because some firms "change ethnicity" during our data period so that coethnicity turns on or off *within investor-investment object pairs*. Table 2 combines both forms of variation so that we can examine coethnic investing market-wide, and because a comprehensive notion of coethnicity is most relevant for aggregate economic consequences—this paper's primary focus.

We now show that coethnic investing in fact appears to be driven in large part by shared identity itself. To do so we replace γ_i and δ_j with an investor-firm fixed effect, exploiting CEO/board turnover to isolate how coethnicity affects investment *within*

[21] The are several potential reasons why board coethnicity may affect investment somewhat more than CEO coethnicity. It could for example be that changes in which ethnic group dominates a board are less frequent than changes in the identity of the CEO and hence provide a more deeply rooted measure of a firm's perceived identity. Note also that the results in Table 2 are similar if we restrict attention to investors and managers from ethnic groups that are indigenous to Kenya.

[22] We know of one existing study that directly investigates the extent to which a range of other *observed*, correlated match effects explain discrimination attributed to coethnicity (or, more precisely, co-religiosity). Lavy *et al.* (2018) do so by controlling for the other observed match characteristics. Such an approach is conceptually similar to that of audit studies in which the worker attributes listed on a CV are held fixed while the name on the CV is experimentally varied (see e.g. Bertrand & Mullainathan, 2004).

investor-investment object pairs. Such an approach will causally identify a more precisely defined coethnicity effect—how shared identity affects investment—under a particular identifying assumption.[23] That assumption is that trends in investment in particular firms—those that switch from being managed by a CEO/board of ethnicity A to one(s) of ethnicity B—relative to in other firms, by investors of ethnicity A and B relative to other investors, are parallel when such switches happen. We begin by providing direct evidence in support of this assumption.

In Figure 1 we restrict attention to points in time around when a given firm "changes ethnicity" by replacing a CEO belonging to one ethnicity with one belonging to another ethnicity. Thirteen out of the 47 firms in our sample experience a change in the CEO's ethnicity during our data period (and three of these experience multiple such switches). We plot the flow of investment from "post-coethnics"—investors of the same ethnicity as the incoming CEO—relative to that of investors who are coethnic with neither the outgoing nor the incoming CEO, in the three months before; the month of such CEO switches; and the three months after. We see that investment from post-coethnics rises markedly—and statistically significantly—in the month the new CEO takes over relative to investment from others. In the subsequent month, the *flow* of investment from post-coethnics is again similar to that of "others", but the relative portfolio share of the firm for post-coethnics relative to others remains at a higher level. From month 2 after the switch onwards we see indications of post-coethnics investing more than others again. Most importantly, we see no indication of concerning non-parallel pre-trends in Figure 1.[24]

In addition to pointing towards a causal interpretation of the results in Table 2—which in part rely on time variation of the form depicted in Figure 1[25]—these patterns

[23]Unobserved match effects between managers and investors that are correlated with coethnicity are—even among the retail investors we focus on—a possibility, but less plausible than the match effects between investors and investment objects themselves that cross-sectional estimation may capture. One reason for this is that managers tend to have much less influence on a firm's activities than features of the firm itself do (Bertrand & Schoar, 2003). Another is Section 4's results on the returns on coethnic investments.

[24]That the estimated coethnicity effect arises only after shared-identity "turns on" is apparent also in raw data separately depicting the flow of investment in the firm for post-coethnics and others, as well as "pre-coethnics"—investors of the same ethnicity as the outgoing CEO. Such a figure is shown in an earlier working paper version of this paper and available from the authors. In the months *before* the CEO ethnicity switch, the trend in investment from all three groups is roughly flat, with a level of investment that is somewhat higher for pre-coethnics and others than for post-coethnics. When the new CEO starts, investment from post-coethnics relative to investment from the two other groups rises noticeably.

[25]Though estimated on the investor×"switcher-firms" sample also used in Table 3 (as non-switchers do not experience the depicted form of event), Figure 1 depicts results from a dynamic version of the (2) specification. This figure therefore maps most directly to Table 2. This is desirable because the market-wide results in Table 2 are the main findings from the "micro" (investor-firm) part of this paper, and they motivate the model in Section 5.

also motivate a version of the regressions in (1) and (2) that includes an investor-firm fixed effect and therefore uses the same "switchers" subsample of firms as in the figure. We show the results in Table 3. We find that, within a given investor-firm pair, investment increases significantly when a CEO or board-member of a different ethnicity than the investor is replaced by a coethnic. We lose some power when restricting the analysis to investor-firm pairs that change CEO coethnicity status during our data period. However, the estimates in Table 3 suggest that investors if anything adjust the share of their investments that is held in a given firm somewhat more when coethnicity "turns on" within a given investor-firm pair than they do in the cross-section.[26] The two investor-board coethnicity measures both increase in magnitude and remain highly statistically significant when we restrict attention to changes in coethnicity within investor-investment object pairs. The patterns in Figure 1 provide direct, visual support for a causal, shared identity-based interpretation of the results in Table 3. This is important for interpreting the estimates in Table 2.

In this section we showed that Kenyan investors invest considerably more in a given firm when the firm is run by coethnics. We also showed that such coethnic investing appears to be driven to a large extent by shared identity in and of itself. This finding foreshadows the results in the next section, where we investigate investors' motivation for skewing their capital allocation towards coethnic companies by examining its consequences for investors' returns.

4 Understanding Ethnic Investing

As discussed in the introduction, ethnic investing may broadly speaking be due to *information asymmetries* or investor *preferences or biases*. The former imply higher returns, and the latter lower or equal returns, on coethnic investments. Both explanations are consistent with the results in Section 3, although the finding that Kenyan investors favor coethnic firms in part due to shared identity suggests that preferences or biases likely play a role in their underlying motivations.

[26] The same holds when we consider investment flows in the bottom panel and $\text{CoethnicFirm}_{ijt}$ is measured as $\text{CoethnicBoard}_{ijt}$, $\text{BoardCoethnicityIndex}_{ijt}$, or $\text{CEOCoethnicityIndex}_{ijt}$. However, for this outcome, the estimated coefficient of interest is negative (but noisily estimated) when $\text{CoethnicFirm}_{ijt}$ is defined as $\text{CoethnicCEO}_{ijt} = 1$, a surprising result relative to the other estimates in tables 2 and 3 that may be due to the smaller sample of firms that can be used in Table 3.

To investigate, we run the following regression:

$$\text{RiskAdjReturns}_{bijt} = \alpha + \beta \text{CoethnicFirm}_{ijt} + \gamma_i + \delta_j + \psi_{c(jt)} + \theta_t + \varepsilon_{bijt} \qquad (3)$$

where the outcome variable is the risk-adjusted return on investment b made by investor i in firm j in month t, and the other variables are as defined above. We measure $\text{RiskAdjReturns}_{bijt}$ in several different ways; our preferred measure is simply the Sharpe Ratio. We measure the Sharpe Ratio as the difference between the returns on the investment and the risk-free return, divided by the standard deviation of the difference. Within a given firm-month pair—that is, for "buys" of the stock of a given firm made in a given month—$\text{RiskAdjReturns}_{bijt}$ varies across investors. This is because different investors invest in the firm on different days within the month and sell their stocks at different times. The results from (3) are shown in Table 4.

A given investor's risk-adjusted return on her investment in a given firm in a given month are respectively 9.6 and 21.8 percent lower if the investment is made when the firm is run by a coethnic CEO or when the investor has maximum ethnic proximity to the CEO, relative to when the investment is made when the CEO is a non-coethnic. This can be seen in the first two columns of the top panel of Table 4. Similarly, an investor's risk-adjusted return on investments made when the firm's board is generally of the same ethnicity as the investor are 44.8 percent lower.[27] The results in the bottom panel are similar; there we estimate how coethnic investing affects returns by exploiting changes in coethnicity within investor-firm pairs as in Table 3. In many columns of the bottom panel the negative estimates are even larger in magnitude.

The measures of returns and risk we use are common in the finance literature. Alternative measures generally give similar results and imply the same broad conclusions. In Appendix A3 we provide more detailed information on this and a series of additional results. We now present a few especially informative further findings. In Appendix Table A2 we show that the results are very similar to those in Table 4 if we restrict our sample to investors who both bought and sold during our sample period. The same is true in Appendix Table A3, where we restrict the sample to firms whose CEO ethnicity remains constant during our data period[28], and in Appendix Table A4, where we show

[27] We lack power to estimate how risk-adjusted returns differ for investments made when the firm is run by a board with a greater versus a lower $\text{BoardCoethnicityIndex}_{ijt}$ with precision. The point estimate is small but positive.

[28] For these firms the estimated differential return on coethnic investments cannot be due to any stock price dynamics associated with CEO (ethnicity) turnover.

the relationship between coethnicity end-of-first-year returns.

These results compare coethnics and non-coethnics investing in the same firm. This suggests that coethnicity may induce investors to invest in a firm at times that imply low risk-adjusted returns. In Appendix Figure A1 we show short-run returns around the time a firm changes its (CEO) ethnicity. These are the returns an investor would have made if they bought stock in the firm at the point in time indicated on the x-axis and sold the investment one month later. We see that the monthly return is on average lower soon after a firm "changes ethnicity". Appendix Figure A2 additionally shows that "post-coethnics" earn lower returns compared to others in the period after such "switches". These findings are telling when viewed in combination with the evidence in Figure 1 that "post-coethnics" are especially likely to invest at such times.

We have so far focused on the differential returns individual investors make on coethnic investments on *average*. This is the appropriate basis for investigating the most common motivations underlying Kenyan stock market investors discriminating against non-coethnic firms on average, as we saw in Section 3 that they do. However, it would be surprising if there wasn't considerable heterogeneity in the extent to which investors favor coethnic firms, or their reasons for doing so. In Appendix Table A5 we show that both high-portfolio-value and highly experienced investors favor coethnic firms much less—indeed, they tend not to discriminate on the basis of firms' ethnicity—than other individual investors do. In Appendix Table A6 we show that such investors also tend not to earn lower risk-adjusted returns on their coethnic investments. These results add important nuance to the results in tables 2-4, and more speculatively *may* hint at encouraging longer-term trends in Kenyan investing.

Our results so far indicate that, on average, Kenyan investors engage in coethnic investing, and that this lowers their risk-adjusted returns. A taste for or psychological bias towards coethnic firms thus appears to be the most common motivation for favoritism. In a setting where individual investors are generally small, these average behaviors and motivations are the natural starting point for a theoretical framework focusing on the aggregate economic consequences of coethnic investing. In the next section we present such a model; corresponding empirical tests are in Section 6. A primary focus will be how neutral investors affect the aggregate impact of the costly form of favoritism that individual investors in our sample display on average, accounting for variation in investor size. We theoretically conceptualize neutral investors as a *different category* than biased-on-average individual investors, and empirically proxy for

them simply with foreign and institutional investors[29], but show in the appendix that the model's key results hold also in the case where only a subset of local investors are ethnically biased.

5 Theoretical Framework

This paper studies how discrimination manifests itself in a market. So far we have analyzed investment behavior across investment objects of different types and the associated consequences for individual investors. This micro-level analysis allows us to uncover the extent to investors favor coethnic firms and their motivation for doing so.

Coethnic investing of the form we have documented, in which investors partially "neglect" non-coethnic firms and thereby earn lower risk-adjusted returns, may have adverse *aggregate* economic consequences. If each group of investors exclusively or primarily invests in firms of a specific type, this will—relative to a scenario in which investors are neutral—tend to lower the average value of a firm. The reason is that investors as a whole could earn higher returns by investing in firms with a smaller investor base. This "clientele" prediction, first emphasized by Merton (1987)[30], only holds if responses to coethnic investing on the demand- and supply-side of the market are limited in scope, however.

We now consider a model of the financial market where firms differ in ethnicity and some investors favor coethnic over non-coethnic firms. For clarity we focus on the case where there are two ethnicities.

5.1 Firms

We study a one-period world where there are two types of firms, which differ in ethnicity (as defined for example by their CEO or board). To begin with we make the general assumption that firms of a given type have the same production technology, characterized by a normally distributed cash flow with mean μ_i and variance σ_i^2, where $i = 1, 2$. We further assume that the cash flow of firms of each type is perfectly correlated, while

[29] We thus leave a deeper investigation of heterogeneity in the extent to which individual, Kenyan investors favor coethnic firms to future research.

[30] The comparative static analysis in Merton (1987) is cross-sectional in the sense of assuming that the market portfolio and aggregates of the economy do not vary with changes in the relative size of investor groups, but the intuition underlying the predictions we discuss below is straightforward and holds more broadly.

the covariance of the cash flow of firms of different types is σ_{12}. The total outstanding shares of stocks in the market are given by N_i, $i = 1, 2$.

In addition to stocks of firms, there's also a riskless asset whose rate of return is normalized to zero and whose supply is perfectly elastic. Further, borrowing is allowed but short-selling of risky assets is not.

5.2 Investors

Investors are categorized by their ethnicity and and whether they engage in ethnically biased or neutral investing. There are three types of investors, one neutral and the other two biased towards firms of their own ethnicity. Biased investors only invest in firms run by coethnics, while neutral investors invest in both types of firms.[31] Let I denote the total number of investors, α the share of neutral investors, and β the share of biased investors that belong to ethnic group 1. All investors have absolute risk aversion preference with risk tolerance τ.

5.3 Equilibrium

Let x_i denote the number of shares of firms of type i owned by biased investors i; x_{ni} that owned by neutral investors; and p_i the price per share of firms of type i. Given CARA preferences and normally-distributed cash flow, the optimal portfolio choices of investors are given by the first order conditions, which can be simplified to:

$$x_i = \frac{\tau(\mu_i - p_i)}{\sigma_i^2} \tag{4}$$

$$x_{n1} = \frac{\tau[\sigma_2^2(\mu_1 - p_1) - \sigma_{12}(\mu_2 - p_2)]}{\Delta} \tag{5}$$

$$x_{n2} = \frac{\tau[\sigma_1^2(\mu_2 - p_2) - \sigma_{12}(\mu_1 - p_1)]}{\Delta} \tag{6}$$

where $\Delta = \sigma_1^2\sigma_2^2 - \sigma_{12}^2$.

[31] When we test the model's predictions empirically, this implies treating all individual, Kenyan investors as biased, since we observe a particular group of investors—institutional investors and foreigners—that are plausibly less biased (since no firms are coethnic with such "neutral" investors). We show in Appendix A5 that the model's key results hold also in the case where only a subset of the investors belonging to each ethnicity are biased towards firms of their own ethnicity. This is true also for the corresponding empirical results; tests that more closely follow the version of the model shown in the appendix are available from the authors upon request.

Equilibrium prices are solved by imposing the constraints:

$$\alpha I x_{n1} + (1-\alpha)\beta I x_1 = N_1$$
$$\alpha I x_{n2} + (1-\alpha)(1-\beta) I x_2 = N_2$$

which give:

$$p_1 = \mu_1 - \frac{\sigma_1^2[(1-\alpha)(1-\beta)N_1\Delta + \alpha(N_1\sigma_1^2 + N_2\sigma_{12})\sigma_2^2]}{I\tau[\beta(1-\beta)(1-\alpha)^2\Delta + \alpha\sigma_1^2\sigma_2^2]}$$
$$p_2 = \mu_2 - \frac{\sigma_2^2[(1-\alpha)\beta N_2\Delta + \alpha(N_2\sigma_2^2 + N_1\sigma_{12})\sigma_1^2]}{I\tau[\beta(1-\beta)(1-\alpha)^2\Delta + \alpha\sigma_1^2\sigma_2^2]}$$

It is then straightforward to see that $\beta(1-\beta)(1-\alpha)^2\Delta + \alpha\sigma_1^2\sigma_2^2 > 0$ and thus $p_i < \mu_i$.

5.4 Results

We now derive results that set the stage for the empirical analysis to follow. We assume for simplicity that the two types of firms differ only in their ethnicity—their return structures are the same (i.e., $\sigma_1 = \sigma_2 = \sigma$ and $\mu_1 = \mu_2$).

The equilibrium prices can be simplified to:

$$p_1 = \mu - \frac{\sigma^2[N_1(1-\rho^2)(1-\beta)(1-\alpha) + \alpha(N_1 + N_2\rho)]}{I\tau A}$$
$$p_2 = \mu - \frac{\sigma^2[N_2(1-\rho^2)\beta(1-\alpha) + \alpha(N_1\rho + N_2)]}{I\tau A}$$

where $A = (1-\rho^2)\beta(1-\beta)(1-\alpha)^2 + \alpha$ and ρ denotes the correlation coefficient.

The following proposition characterizes the relationship between a firm's stock price and the relative size of its coethnic investor base:

Proposition 1. *A firm's stock price is increasing in the share of biased investors of the firm's ethnicity under reasonable conditions.*

Proof. See Appendix A4. □

To see the intuition and to focus on demand-side effects, we simplify the conditions for this proposition to hold (in particular inequality (10) in the appendix), by assuming equal total number of shares between the two type of firms, i.e., $N_1 = N_2$, which gives

$$1 > \frac{(2\beta - 1)\rho\alpha(1-\alpha)}{\alpha + \alpha(1-\alpha)(1-2\beta) + (1-\beta)(1-\alpha)^2(1-\rho^2)^2}. \tag{7}$$

In the case where $\rho < 0$, inequality (7) always holds. However, in the case where $\rho > 0$, it holds when $\beta \leq \frac{1}{2}$ but may not hold otherwise. When returns from the two types of stocks are positively correlated, firms' of the majority-ethnicity face greater demand and are thus priced more highly in a world without neutral investors. As a result, neutral investors hold more shares from minority-ethnicity firms since both types of firms have the same return structure. As a firm's coethnic investor base grows, there are two forces in play. First, the firm faces greater demand from biased investors, which puts upward pressure on the stock price. Second, the firm becomes less attractive to neutral investors, who then reduce their holdings of its stock. This puts downward pressure on the stock price. The first effect dominates when β is small, but if there are sufficient neutral investors, the second effect can dominate for some large β.

The next proposition studies the case in which firms can change their ethnicity, for example by replacing managers of one ethnic group with managers of another one.

Proposition 2. *A firm can benefit from changing its ethnicity from that of the smaller (investor) group to that of the larger (investor) group under reasonable circumstances.*

Proof. See Appendix A4. □

When a firm changes its ethnicity, it not only changes its investor base but also the supply of a type of stocks. For small firms that have little influence on total supply, the benefits from switching from minority-ethnicity to majority-ethnicity are unambiguous. However, large enough firms can have so big an impact on supply and thus put so great downward pressure on the stock price that a switch becomes unprofitable.

It is worth noting that there are of course other reasons than what is captured in this model for why firms might or might not benefit from changing ethnicity (such as e.g. CEO transition costs). We come back to this in more detail in Sub-section 5.5.

The following proposition and corollary show the cost of coethnic investing for the market as a whole:

Proposition 3. *Total market value is increasing in the share of neutral investors.*

Proof. See Appendix A4. □

Coethnic bias worsens risk-sharing and leads to a less efficient stock market. As a result, firms on average face a higher cost of capital. As the number of neutral investors grows, the distortion caused by coethnic bias decreases, and the aggregate market value increases. The cost of ethnic bias can be measured as the difference in total market value between a situation in which some investors are ethnically biased and one in which all or more are neutral.

The next proposition examines how increasing the share of neutral investors affects firms of different ethnicities. We abstract from the additional effect from differences in outstanding shares by assuming $N_1 = N_2$ so that we can focus on the demand side.

Proposition 4. *A marginal increase in the share of neutral investors has a larger effect on the stock price of firms of the minority ethnicity.*

Proof. See Appendix A4. □

When total outstanding shares are the same, the stock price of firms of the minority-ethnicity is lower and they are therefore more attractive to neutral investors. An increase in the share of neutral investors consequently affects the market value of these firms more.

5.5 Supply- and demand-side responses to coethnic investing

We have described a partial equilibrium with ethnically-biased investing of the form we documented in sections 3 and 4. Proposition 1 then implies that the price of majority-ethnicity firm shares will be higher than that of otherwise similar minority-ethnicity firm shares. We might then expect both demand- and supply-side responses, and for these to counteract the value loss from coethnic investing.

First, unbiased investors may enter the market, as will tend to happen as a stock market like Kenya's grows. Proposition 3 and 4 then predict an increase in total market value and especially in the value of minority-run firms.[32] We test these predicted impacts of counteracting demand-side forces in the next section.

Second, undervalued minority-ethnicity firms may seek to increase their market value by strategically responding to coethnic investing. Proposition 2 states that they

[32]It may also be that majority-ethnicity firms themselves or neutral owners of majority-ethnicity firm shares increase the supply of such shares, or that already-active neutral investors shift demand from majority-ethnicity to minority-ethnicity firm shares, in response to the price wedge. These forces will tend to have similar effects to neutral investors joining the market, reducing the price wedge between the two types of firms.

can do so by "becoming" a majority-ethnicity firm, for example by appointing a CEO from the larger ethnic (investor) group. We test also for this predicted effect of a counteracting market force—this one on the supply-side—in the next section.

For demand- and supply-side responses to *eliminate* the difference in investment objects' value and the impact on aggregate value creation that arises when investors are ethnically biased, such responses would need to be of comparable magnitude to investor biases themselves. They may not be because markets—even text-book ones like stock exchanges—often display barriers to or costs associated with market responses. Limiting costs of arbitrage are well-established (Gromb & Vayanos, 2010), and less biased investors (like foreigners and institutional investors) may have easy access to other appealing markets to invest in. Similarly, firms tend to experience significant transition costs when they replace one CEO with another, and the labor market for potential CEOs is thin in a country like Kenya.[33]

As this discussion makes clear, we expect preference- or psychology-based coethnic investing to distort the relative price of firms with large and small coethnic investor bases. This will tend to lower the average price of a firm and the total value of a market. However, we also expect demand and supply responses to counteract the overall impact of coethnic investing in predictable ways.

6 The Consequences of Ethnic Investing

6.1 Ethnic investing and the value of a firm: empirics

The size of Kenyan firms' coethnic investor bases vary over time. In combination with the fact that we observe all investors and all firms on the country's stock market, this means that we can estimate how demand affects stock prices in a way that to our knowledge has not been possible in the existing literature.

To test how coethnic investing affects the price-to-book value of a firm, we first run regressions of the following simple form:

$$\text{PriceToBook}_{jt} = \alpha + \beta \text{CoethnicInvestorBase}_{jt} + \delta_j + \theta_t + \varepsilon_{jt} \tag{8}$$

We include firm fixed effects δ_j, month fixed effects θ_t, a value control that varies at

[33] It may be, for example, that some ethnic groups have better access to the education and managerial experiences through which individuals accumulate the complex skills needed to lead a large company (Terviö, 2009). It could also be that frictions simply make it harder to find the suitable candidates in some communities (Hjort *et al.* , 2020).

firm×month level (ROE), and cluster the error term ε_{jt} at the firm level. The regressor of interest is the size of the firm's coethnic investor base, the estimated sign on which should be significantly positive if coethnic investing of the form identified in sections 3 and 4 distorts firms' stock market valuations. We measure $\text{CoethnicInvestorBase}_{jt}$ simply as the portfolio value investors that are active—that is, that trade—at time t and who belong to the same ethnicity as firm j's CEO hold, relative to that of all potentially active coethnic investors. We define potentially active investors as all individual investors who have invested on the NSE up to and including the month in question.

We restrict the sample to firms whose ethnicity remains constant during our data period—that is, firms which do not change their CEO to someone belonging to a different ethnicity—so as to focus on demand-side variation. In this sample, variation in $\text{CoethnicInvestorBase}_{jt}$ thus arises from investors joining or leaving the stock market and changes in their activity. The inclusion of firm and month fixed effects, and the focus on *potential* coethnic investors, leave room only for very particular non-causal interpretations of the results from (8).[34] However, as we examine how firm value responds to coethnic investor bases *market-wide*, we are not able to exploit relevant exogenous variation in $\text{CoethnicInvestorBase}_{jt}$. Interpreting the results from (8) through the lens of the model in Section 5 and the investor behavior documented in sections 3 and 4 that motivated the model, will therefore be helpful.

We find that when the coethnic investor base of a given firm on the NSE increases in size, the price-to-book value of the firm increases significantly relative to other firms, consistent with Proposition 1 of the framework in Section 5. This result is in the first column of Panel A of Table 5. The estimate implies, for example, that we would expect the price-to-book value of a firm that is led by a CEO from an ethnic group that has the same proportional number of investors as the group with the biggest investor base observed in our data to be 67 percent greater than an otherwise identical firm led by a CEO from an ethnic group with an investor base of the same size as the smallest one in our data.[35]

[34] Two patterns are arguably necessary for the estimated coefficient on $\text{CoethnicInvestorBase}_{jt}$ in (8) to not reflect a causal effect of the relative size of firms' coethnic investor bases. First, that large numbers of retail investors of a given ethnicity become active or inactive on the stock market at times when particular firms of the same ethnicity (but not the market as a whole) whose market value is in fact not responsive to coethnic demand, would in any case have seen a notable increase or decrease in their stock price for other reasons. And second, that such "attraction-without-responsiveness" dynamics are either highly correlated across firms of a given coethnicity, or driven by firms' whose attraction is large enough to spill over onto other firms of the same ethnicity (as we "assign" active investors of a given ethnicity to all firms of the same ethnicity).

[35] This calculation uses the average investor base size of firms in our data. The biggest investor base size is thus

To test Proposition 3 of the model—the conjecture that market value is increasing in the share of neutral investors—we next add the additional regressor $\text{NeutralInvestorBase}_t$ to (8). We proxy for neutral investors with foreign and institutional investors. Since these neutral investors are not coethnic with any firms, $\text{NeutralInvestorBase}_t$ varies only across months.[36] The average proportion of active neutral investor is 4.2 percent in our sample.

We find that firms' average price-to-book value increases significantly when the proportion of active investors that are neutral is higher. We show this in the second column of Panel A of Table 5. The estimates suggest, for example, that a doubling of the share of neutral investors is associated with 2.7 percent higher price-to-book firm value on average. However, we also find—again consistent with the framework in Section 5—that neutral investors influence the value of any given firm notably less than investors that are coethnic with the firm do. This result underscores that investor favoritism is a different phenomenon than demand itself.

We next show that minority-ethnicity firms especially benefit from neutral investors. To do so we simply add the interaction between $\text{CoethnicInvestorBase}_{jt}$ and $\text{NeutralInvestorBase}_t$ to the regression. The results in Column 3 of Panel A of Table 5 imply, for example, that we would expect the price-to-book value of a firm that is led by a CEO from an ethnic group that has the same proportional number of investors as the group with the smallest coethnic investor base observed in our data to increase 32 percent more in response to a doubling of the share of neutral investors than that of an otherwise identical firm with a coethnic investor base as large as the biggest one observed in our data. This finding is consistent with Proposition 4 of the model in Section 5 and especially important because it illustrates the sense in which coethnic investing "misallocation demand" across firms.

In Panel B of Table 5 we estimate the impact on the value of a firm of the size of its coethnic investor base in an alternative way. Thirteen of the 47 firms in our sample "change ethnicity" during our data period. We now code changes in a firm's investor base exclusively as 0/1 up-or-down events resulting from CEO (ethnicity) turnover,

equal to the investor base size of the firm which has the maximum average size. The smallest investor base size is defined analogously.

[36] To test a hypothesized impact of an explanatory variable defined at the market×month level, we naturally rely on variation at the same level. Since θ_t is collinear with $\text{NeutralInvestorBase}_t$, it is left out of this version of the regression. Similar to $\text{CoethnicInvestorBase}_{jt}$, we measure $\text{NeutralInvestorBase}_t$ as the portfolio value of neutral investors that are active—that is, that trade—at time t, relative to that of all potentially active investors. We now define potentially active investors as all individual, Kenyan investors and neutral investors who have invested on the NSE up to and including the month in question.

and restrict attention to 12 month windows around such events in the spirit of an event study analysis. In this way we test Proposition 2 of the model in Section 5, which considers how a particular supply-side response to investor favoritism should affect individual firms' valuation—the conjecture that a firm can benefit from changing its ethnicity to that of a larger investor group. Exploiting abrupt and large changes in firms' coethnic investor bases arising through behavior on the other side of the market also allows us to corroborate the finding in Column 1 of Panel A of Table 5 that firms whose coethnics make up a larger proportion of active investors in the market tend to be higher-valued. We run the following regression:

$$\text{PriceToBook}_{jt} = \alpha + \beta \text{I(CEO switched} \rightarrow \Delta\text{CoethnicInvestorBase)}_{jt} + \delta_j + \theta_t + \varepsilon_{jt} \quad (9)$$

Here, $\text{I(CEO switched} \rightarrow \Delta\text{CoethnicInvestorBase)}_{jt}$ is an indicator for firm j changing its CEO from an individual belonging to one ethnicity to someone else belonging to another ethnicity. The indicator equals one in any month t after the switch. Such a switch implies either an increase or a decrease in the firm's coethnic investor base.[37] β thus captures the impact on a firm's stock market value of a change in CEO ethnicity that changes the size of the firm's coethnic investor base. We include firm and month fixed effects, and cluster the error term ε_{jt} at the firm level.

We find that a firm that changes its ethnicity from one with a smaller to one with a larger investor base sees a significant and large—33.2 percent—increase in its price-to-book value, while a firm changing its ethnicity from one with a larger to one with a smaller investor base sees a significant and large—albeit proportionally smaller, at around 20.6 percent—decrease in its price-to-book value. The results are shown in Panel B of Table 5. These findings exploiting variation in firms' coethnic investor base coming from the supply (firm) side of the market support the evidence from Panel A, where variation in investor base comes from the demand (investor) side of the market.[38]

In sum the evidence we have presented in this section points towards three conclusions.[39] The first is that the available funds of potential investors of the same ethnic

[37] (9) is short-hand in that we distinguish between "up" and "down" events in the regressions we run.

[38] In Appendix A6 we run a version of (9) that additionally includes terms capturing displacement effects—spillovers onto the value of *other* firms—of changes in a given firm's ethnicity, akin to Crépon *et al.* (2013)'s approach to estimating displacement effects of active labor market policies in France. We find little evidence for such spillovers but lack power to estimate them precisely.

[39] As discussed above in relation to Panel A, in itself Table 5 does not rule out other interpretations. Similarly to the alternative interpretation of the results in Panel A discussed in the third paragraph of Sub-section 6.1, the results in Panel B could be consistent e.g. with an alternative story in which the ability of CEOs from ethnic majority groups

group as a given firm *relative* to those of all potential investors influence the value of large firms in Kenya, as the model in Section 5 predicts when investors have a taste for or psychological bias towards coethnic firms. We see a significant change of the expected sign in the valuation both of firms whose relative investor base size changes because investors join and leave active investing on the NSE and those that "change ethnicity" and therefore see the size of their coethnic investor base change. The second conclusion is that demand- and supply-side responses counteracting coethnic investing—neutral investors entering the market, and firms changing their ethnicity through choice of management—affects firms' value as theory predicts. Finally, and most importantly, the first take-away holds despite of the second one. This implies that the magnitude of counteracting market responses to investor favoritism isn't large enough to offset its impact on market-wide value creation.

6.2 The cost of ethnic investing

We can now estimate the overall cost of coethnic investing. Since this paper's focus is how investor discrimination or nonneutral demand manifests itself in a market, we focus on counterfactual demand-side scenarios.

The proof of Proposition 3 and Proposition 4 characterize how an increase in the share of neutral investors and corresponding decrease in the share of ethnically biased investors—as we might expect to occur over time—will affect market-wide value creation. We consider two counterfactual scenarios inspired by Merton (1987)'s clientele theory.[40] In both cases, we vary only the share of neutral investors, while holding constant the relative shares of biased investors of different ethnicities.

In the first counterfactual scenario, we assign all listed firms a neutral investor base as large as the largest one observed during our data period—corresponding to the particular month during our sample when foreign and institutional investors made up the largest share of all potentially active investors. In the second scenario, we simply increase the share of neutral investors in the market to half, or in other words,

exceeds that of CEOs from ethnic minority groups, and majority CEOs therefore generating higher cash flows for firms they manage. However, such a story cannot explain the results in Panel A of Table 5, where we control for the ethnicity of the CEO. Perhaps more importantly, the aggregate patterns in Table 5 are—as the theoretical framework in Section 5 makes clear—exactly what theory predicts we should see under the form of causally identified "neglect" of non-coethnic firms we established in sections 3 and 4, in a situation in which compensating market responses haven't already equated demand for and supply of different types of firms.

[40] Merton (1987) points out that a situation in which each firm's "clientele"—its potential investors—is made up of *all* investors in the market conceptually corresponds to one in which investors are neutral.

set NeutralInvestorBase$_t = 0.5$ and CoethnicInvestorBase$_{jt} = 0.5$ for all firms in our sample. In both scenarios, we calculate expected changes in firms' valuation using the estimated coefficients on the second and third regressors, NeutralInvestorBase$_t$ and NeutralInvestorBase$_t \times$ CoethnicInvestorBase$_{jt}$, in columns 2 and 3 of Panel A of Table 5, and firms' information (book value and outstanding shares) at the end of our data period in December 2010.

Using the version of the counterfactuals in which we do not account for differential effects of neutral investors on firms with larger and smaller coethnic investor bases to illustrate, suppose that the estimated coefficient on firms' neutral investor base in the regression corresponding to Column 2 of Panel A of Table 5 is $\hat{\gamma}$. $(\text{NeutralInvestorBase}^C_{jt} - \text{NeutralInvestorBase}_{jt}) \times \hat{\gamma}$, is thus the difference between the firm's price-to-book value under the counterfactual less-coethnic-investing scenario and the observed state of the world. This implies that the decrease in the expected value of a firm due to coethnic investing is $(\text{NeutralInvestorBase}^C_{jt} - \text{NeutralInvestorBase}_{jt}) \times \hat{\gamma} \times \text{BookValue}_{jt} \times \text{TotalShares}_{jt}$. Computing this quantity for the last month observed in our data suggests that listed Kenyan firm could collectively be worth USD 5.88 billion or 41 percent more if the proportion of neutral investors in the market was as high as the maximum observed across the months in our sample.[41] If instead we use the estimates from Column 3 of Panel A of Table 5 and thus account for differential effects of neutral investors on firms with larger and smaller coethnic investor bases, this counterfactual scenario is predicted to increase the value of listed Kenyan firms by USD 8.96 billion or 63 percent.

In the other counterfactual scenario, in which half of all investors are neutral, listed Kenyan firms are predicted to collectively be worth USD 5.23–7.90 billion or 37–55 percent more, depending on whether we use the specification from Column 2 or 3 in Panel A of Table 5.

Both scenarios are far out-of-sample compared to the share of neutral investors in almost all months during our data period. The counterfactual calculations we present therefore rely on substantial extrapolation of the linearly estimated effect of neutral investors in Panel A of Table 5. These estimates nevertheless underscore the massive market-wide value loss that likely results from coethnic investing in Kenya.

[41] Since in the regression we use $\log(\text{PriceToBook})$, the decrease in the expected value of a firm due to coethnic investing is given by $[\exp\{(\text{NeutralInvestorBase}^C_{jt} - \text{NeutralInvestorBase}_{jt}) \times \hat{\gamma}\} - 1] \times \text{PriceToBook}_{jt} \times \text{BookValue}_{jt} \times \text{TotalShares}_{jt}$. These expected value gains are calculated using the estimated coefficient on "NeutralInvestorBase" in Column 2 of Panel A of Table 5. Note that 47 firms were listed on the NSE in December 2010.

7 Conclusion

Ethnic investing—"excess" investing in coethnic relative to non-coethnic investment objects—is common worldwide, but why do investors behave in this way, and what are the consequences? In this paper we first use transaction data from Kenya's stock exchange and CEO/board turnover to document the surprising extent of ethnic investing—even *within investor-investment object pairs*—in a large, anonymous type of market that is broadly considered among the most efficient ways to allocate capital. This occurs despite coethnic investments earning lower risk-adjusted returns, pointing towards a taste-based or psychological explanation. Taking advantage of the complete market nature of a stock exchange and variation over time in firms' coethnic investor bases and neutral investor activity, we then show that while both demand-side and supply-side market responses counteract ethnic investing, they do not offset the massive impact of coethnic investing on total value creation.

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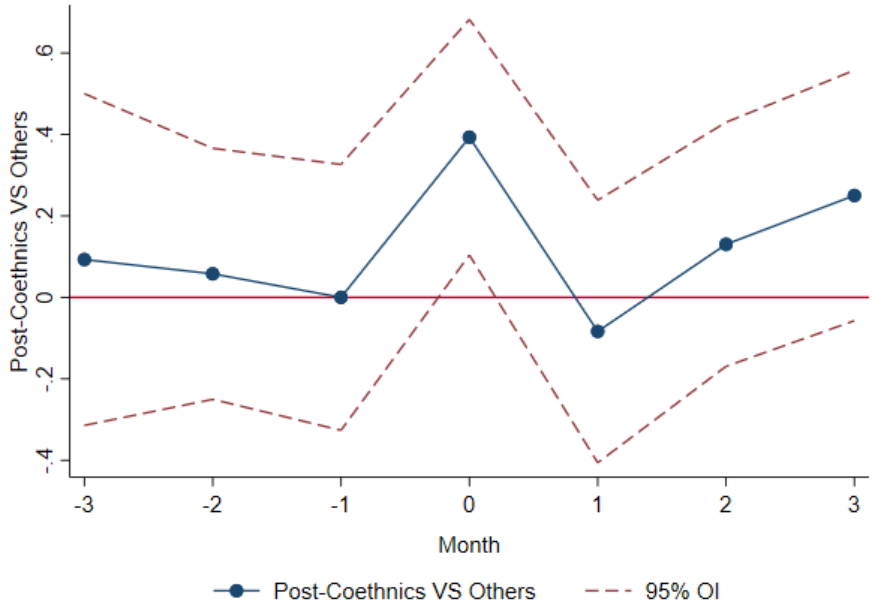
Figures

FIGURE 1: INVESTMENT FLOWS FROM "POST-COETHNICS" VS OTHERS WHEN A FIRM "CHANGES ETHNICITY" DUE TO CEO TURNOVER



We regress the monthly OI between post-coethnics and others. Post-coethnics mean the investor and the firm are coethnic after the firm switches CEO. Others mean the investor and the firm aren't coethnic both before and after the firm switches CEO. The sample uses only those firm where the ethnicity of the CEO changes at least once, and we delete the pre-coethnics sample. The change occurs at month 0. This figure is consistent with Figure A1.

Tables

TABLE 1: SUMMARY STATISTICS

Variable	Mean	Std. Dev.
Panel A: Investor level		
N = 54915		
Average portofolio value 2006 (USD)	5999	66832
Average portofolio value 2010 (USD)	4570	47340
Panel B: Firm level		
N = 47		
Listed by 2006	.872	.337
Agricultural	.089	.288
Commercial and Services	.244	.435
Finance and Investment	.311	.468
Industrial and Allied	.356	.484
Market cap. 2006 (USD 000's)	260599	466847
Market cap. 2010 (USD 000's)	285579	488948
Panel C: Investor $\times$ firm $\times$ month level		
N = 658188		
Investment	.547	.405
Order Imbalance	.069	.985
CoethnicCEO	.271	.445
CoethnicBoard	.406	.491
CEOCoethnicityIndex	.184	.294
BoardCoethnicityIndex	.152	.168
Risk-adjusted Returns	.094	4.706

The dataset spans January 2006-December 2010. The data consists of all investors observed over the period that have made at least five trades (buying or selling) in a given year, as well as 47 firms that were listed on the NSE during some part of the period. These firms include ACCS, BAMB, BAT, BBK, CABL, CMC, DTK, EABL, EQTY, EVRD, HFCK, ICDC, JUB, KCB, KEGN, KENO, KNRE, KPLC, KQ, MSC, NBK, NIC, NMG, OCH, PORT, REA, SCAN, SCBK, SCOM, SGL, TOTL, TPSE, ARM, SASN, FIRE, PAFR, UNGA, BERG, CFC, UCHM, COOP, CandG, MASH, KUKZ, BOC, UTK, CARB. The trades have been aggregated to the investor-firm-month level. For any given investor and firm, only those months where a trade has been made are included. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

TABLE 2: INVESTOR-FIRM COETHNICITY AND INVESTMENT

	(1) Investment	(2) Investment	(3) Investment	(4) Investment
CoethnicCEO	0.00979***			
	(0.00313)			
CEOCoethnicityIndex		0.0110***		
		(0.00359)		
CoethnicBoard			0.0197***	
			(0.00352)	
BoardCoethnicityIndex				0.0461***
				(0.00809)
Value Controls	Yes	Yes	Yes	Yes
Investor FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
CEO Ethnicity FE	Yes	Yes	Yes	Yes
Mean of Dep. Var.	0.547	0.546	0.560	0.543
R2	0.399	0.393	0.431	0.390
N	273466	399457	187355	429519
	(1) OI	(2) OI	(3) OI	(4) OI
CoethnicCEO	0.00881*			
	(0.00462)			
CEOCoethnicityIndex		0.0128**		
		(0.00532)		
CoethnicBoard			0.0708***	
			(0.00631)	
BoardCoethnicityIndex				0.117***
				(0.0145)
Value Controls	Yes	Yes	Yes	Yes
Investor FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
CEO Ethnicity FE	Yes	Yes	Yes	Yes
Mean of Dep. Var.	0.0805	0.0731	0.101	0.0700
R2	0.331	0.325	0.344	0.317
N	409290	602420	280488	648131

The specification is estimated on investor-firm-month-level data. The sample consists of all months in which a trade is made by any investor in any firms stock. Panel A shows the outcome investment, which is the proportion of the investor's portfolio that is held in the share. Panel B shows order imbalance, which measures how much the investor net buys or sells a particular firm's stock, as a proportion of the investor's total traded stock of the same stock during the same month. All specifications in both panels include investor, firm, month, and CEO ethnicity fixed effects and we control for the value control return on equity (ROE) in the prior 12 month period. Standard errors are clustered at the investor level. The dataset spans January 2006-December 2010. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

TABLE 3: INVESTOR-FIRM COETHNICITY AND INVESTMENT WITHIN INVESTOR-FIRM PAIRS

	(1) Investment	(2) Investment	(3) Investment	(4) Investment
CoethnicCEO	0.0123			
	(0.0202)			
CEOCoethnicityIndex		0.0265		
		(0.0219)		
CoethnicBoard			0.0622***	
			(0.00815)	
BoardCoethnicityIndex				0.231***
				(0.0296)
Value Controls	Yes	Yes	Yes	Yes
Pair FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
CEO Ethnicity FE	Yes	Yes	Yes	Yes
Mean of Dep. Var.	0.533	0.529	0.546	0.525
R2	0.606	0.606	0.629	0.606
N	204928	295741	134914	316152
	(1) OI	(2) OI	(3) OI	(4) OI
CoethnicCEO	-0.0353			
	(0.0412)			
CEOCoethnicityIndex		0.0384		
		(0.0453)		
CoethnicBoard			0.157***	
			(0.0188)	
BoardCoethnicityIndex				0.647***
				(0.0629)
Value Controls	Yes	Yes	Yes	Yes
Pair FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
CEO Ethnicity FE	Yes	Yes	Yes	Yes
Mean of Dep. Var.	0.125	0.115	0.140	0.112
R2	0.444	0.445	0.466	0.441
N	306914	449148	201232	481154

The specification is estimated on pair-month-level data. Pair is defined as a unique investor-firm grouping. The sample consists of all months in which a trade is made by any investor in any firms stock. Panel A shows the outcome investment, which is the proportion of the investors' portfolio that is held in the share. Panel B shows order imbalance, which measures how much the investor net buys or sells a particular firm's stock, as a proportion of the investor's total traded stock of the same stock during the same month. All specifications in both panels include pair, month, and CEO ethnicity fixed effects and we control for the value control return on equity (ROE) in the prior 12 month period. Standard errors are clustered at the investor level. The dataset spans January 2006-December 2010. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

TABLE 4: INVESTOR-FIRM COETHNICITY AND RETURNS

	(1) Risk-adjusted Returns	(2) Risk-adjusted Returns	(3) Risk-adjusted Returns	(4) Risk-adjusted Returns
CoethnicCEO	-0.0112***			
	(0.00401)			
CEOCoethnicityIndex		-0.0195***		
		(0.00466)		
CoethnicBoard			-0.0592***	
			(0.00563)	
BoardCoethnicityIndex				0.0110
				(0.0110)
Value Controls	Yes	Yes	Yes	Yes
Investor FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
CEO Ethnicity FE	Yes	Yes	Yes	Yes
Mean of Dep. Var.	0.117	0.0893	0.132	0.0726
R2	0.583	0.568	0.638	0.550
N	216531	318345	150091	342730

	(1) Risk-adjusted Returns	(2) Risk-adjusted Returns	(3) Risk-adjusted Returns	(4) Risk-adjusted Returns
CoethnicCEO	0.00930			
	(0.0214)			
CEOCoethnicityIndex		-0.0875***		
		(0.0327)		
CoethnicBoard			-0.129***	
			(0.0145)	
BoardCoethnicityIndex				-0.104*
				(0.0559)
Value Controls	Yes	Yes	Yes	Yes
Pair FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
CEO Ethnicity FE	Yes	Yes	Yes	Yes
Mean of Dep. Var.	0.162	0.137	0.189	0.120
R2	0.755	0.751	0.787	0.745
N	137215	196784	92344	209102

The specifications are estimated on investor-firm-month-transaction level data. Risk-adjusted returns is the Sharpe Ratio, which is defined as the difference between the risk unadjusted returns and the treasury bill rates in Kenya, divided by the standard deviation of the difference. The sample consists of all transactions initiated during the period. The month indicates origination of the transaction. Specifications in Panel A include investor, firm, month, and CEO ethnicity fixed effects while specifications in Panel B include pair, month, and CEO ethnicity fixed effects. We control for the value control return on equity (ROE) in the prior 12 month period in both panels. Standard errors are clustered at the investor level. The dataset spans January 2006-December 2010. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

TABLE 5: AGGREGATE CONSEQUENCES OF COETHNIC INVESTING

	(1)	(2)	(3)
	Log Price-to-book	Log Price-to-book	Log Price-to-book
Coethnic Investor Base	1.791**	2.343**	11.18***
	(0.737)	(1.111)	(2.189)
Neutral Investor Base		0.644**	0.910***
		(0.308)	(0.256)
Coethnic Investor Base × Neutral Investor Base			-20.67***
			(3.635)
Value Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Month FE	Yes	No	No
CEO ethnicity switch	No	No	No
Mean of Dep. Var.	0.853	0.853	0.853
R2	0.883	0.730	0.747
N	1828	1828	1828

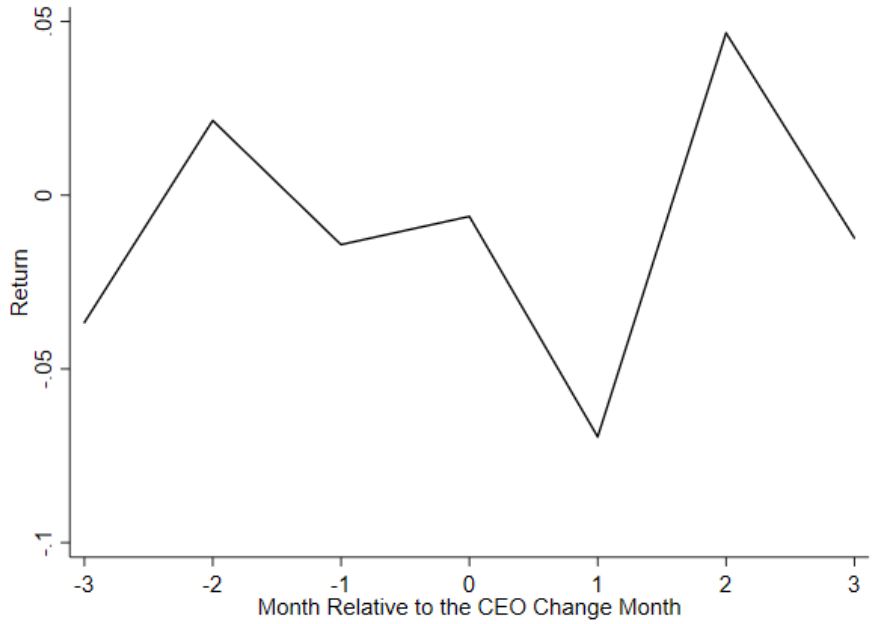
	CEO switch → Investor base ↑	CEO switch → Investor base ↓
	(1)	(2)
	Log Price-to-book	Log Price-to-book
I(CEO switched → Δ CoethnicInvestorBase)	0.332**	-0.206***
	(0.125)	(0.0751)
Value Controls	Yes	Yes
Month FE	Yes	Yes
Firm FE	Yes	Yes
Mean of Dep. Var.	0.966	0.802
R2	0.817	0.848
N	1655	2319

(1) Top panel: Column 1 includes only Biased Investor Base Value, which refers to the aggregate value traded by those coethnic investors in the month as a proportion of total value traded in the same month. Column 2 includes both Biased Investor Base Value and Neutral Investor Base Value, and the latter refers to the aggregate value traded by those neutral investors in the month as a proportion of total value traded in the same month. Column 3 adds the interaction of the two variables. The specifications are estimated on firm-month level data. The dataset spans January 2006-December 2010 and covers only those firms listed on the NSE where the ethnicity of the CEOs remained constant throughout the period. All specifications include firm and month fixed effects and we control for the value control return on equity (ROE) in the prior 12 month period. Stardard errors are clustered at the firm level.
(2) Bottom panel:The specifications are estimated on firm-month level data. All specifications include firm and month fixed effects.Switched CEO is an indicator equal to 1 if the ethnicity of the firm CEOs change during the period. Investor base size has the sme definition as in the top panel. Post switch is an indicator equal to one after the change in CEOs. The sample looks at a 12 month window around the swtich, 6 months prior and 6 months following. Col (1) limits the sample to those firms in which the new CEO has a higher investor base size than the old CEO, and col (2) limits the sample to those firms in which the new CEO has a lower invester base size than the old CEO. All specifications include firm and month fixed effects and we control for the value control return on equity (ROE) in the prior 12 month period. Stardard errors are clustered at the firm level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Appendix

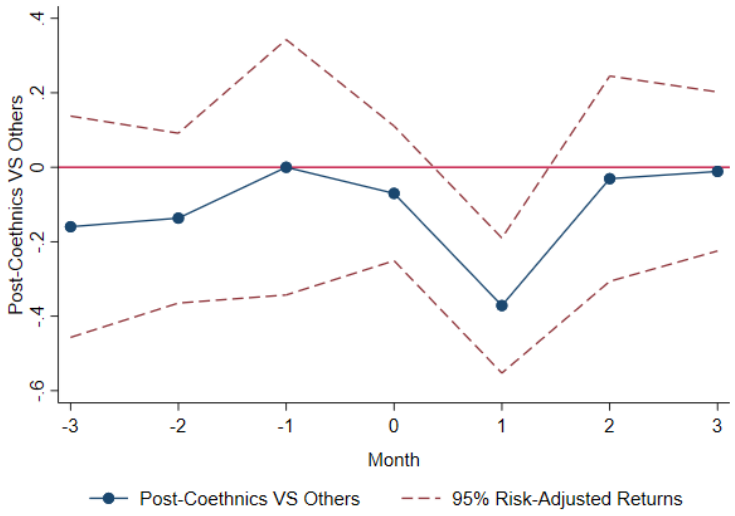
Appendix figures

FIGURE A1: ONE MONTH RETURNS WHEN A FIRM "CHANGES ETHNICITY" DUE TO CEO TURNOVER



The average monthly return over the change month of CEO.The sample uses only those firm where the ethnicity of the CEO changes at least once. The change occurs at month 0.

FIGURE A2: RISK-ADJUSTED RETURNS FROM "POST-COETHNICS" VS OTHERS WHEN A FIRM "CHANGES ETHNICITY" DUE TO CEO TURNOVER



We regress the monthly Risk-adjusted returns between post-coethnics and others. Post-coethnics mean the investor and the firm are coethnic after the firm switches CEO. Others mean the investor and the firm aren't coethnic both before and after the firm switches CEO. Risk-adjusted returns is the Sharpe Ratio, which is defined as the difference between the risk unadjusted returns and the treasury bill rates in Kenya, divided by the standard deviation of the difference. The sample uses only those firm where the ethnicity of the CEO changes at least once, and we delete the pre-coethnics sample. The change occurs at month 1.

Appendix Tables

TABLE A1: INVESTOR-FIRM COETHNICITY AND BUYING STOCKS

	(1) Buy	(2) Buy	(3) Buy	(4) Buy
CoethnicCEO	0.00422*			
	(0.00238)			
CEOCoethnicityIndex		0.00628**		
		(0.00273)		
CoethnicBoard			0.0350***	
			(0.00324)	
BoardCoethnicityIndex				0.0590***
				(0.00740)
Value Controls	Yes	Yes	Yes	Yes
Investor FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
CEO Ethnicity FE	Yes	Yes	Yes	Yes
Mean of Dep. Var.	0.542	0.538	0.553	0.537
R2	0.337	0.331	0.351	0.323
N	395691	583348	271310	627549

The specification is estimated on investor-firm-month-level data. The sample consists of all months in which a trade is made by any investor in any firms stock. This table shows the outcome buy, which is a dummy variable measuring whether the investor purchases the stock during that month.All specifications include investor, firm, month, and CEO ethnicity fixed effects and we control for the value control return on equity (ROE) in the prior 12 month period in both panels. Standard errors are clustered at the investor level. The dataset spans January 2006-December 2010. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

TABLE A2: INVESTOR-FIRM COETHNICITY AND RETURNS: REALIZED RETURN

	(1) Risk-adjusted Returns	(2) Risk-adjusted Returns	(3) Risk-adjusted Returns	(4) Risk-adjusted Returns
CoethnicCEO	-0.0116**			
	(0.00583)			
CEOCoethnicityIndex		-0.0132**		
		(0.00666)		
CoethnicBoard			-0.101***	
			(0.00890)	
BoardCoethnicityIndex				-0.0355**
				(0.0143)
Value Controls	Yes	Yes	Yes	Yes
Investor FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
CEO Ethnicity FE	Yes	Yes	Yes	Yes
Mean of Dep. Var.	0.110	0.0906	0.120	0.0860
R2	0.562	0.544	0.605	0.527
N	86720	128777	61070	139721

The specifications are estimated on investor-firm-month-transaction level data. The sample is restricted to those accounts with a realized return who have both buy and sell. Risk-adjusted returns is the Sharpe Ratio, which is defined as the difference between the risk unadjusted returns and the treasury bill rates in Kenya, divided by the standard deviation of the difference. The month indicates origination of the transaction. All Specifications include investor, firm, month, and CEO ethnicity fixed effects. We control for the value control return on equity (ROE) in the prior 12 month period in both panels. Standard errors are clustered at the investor level. The dataset spans January 2006-December 2010. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

TABLE A3: INVESTOR-FIRM COETHNICITY AND RETURNS: SAMPLE WITH NO CEO ETHNICITY CHANGE

	(1) Risk-adjusted Returns	(2) Risk-adjusted Returns	(3) Risk-adjusted Returns	(4) Risk-adjusted Returns
CoethnicCEO	-0.0158***			
	(0.00533)			
CEOCoethnicityIndex		-0.0176***		
		(0.00608)		
CoethnicBoard			-0.0496***	
			(0.00581)	
BoardCoethnicityIndex				-0.00823
				(0.0137)
Value Controls	Yes	Yes	Yes	Yes
Investor FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
CEO Ethnicity FE	Yes	Yes	Yes	Yes
Mean of Dep. Var.	0.147	0.131	0.160	0.106
R2	0.637	0.618	0.658	0.593
N	171683	243379	133967	267735

The table shows results from regression, which is estimated on investor-firm-month-transaction-level data. The sample is restricted to those firms for which the (ethnicity of the) CEO did not change during our data period. Risk-adjusted returns is defined as the difference between the return on investment of the transaction and the risk-free return, divided by the risk or standard deviation of the monthly returns over the holding period. The sample consists of all transactions initiated during the period. The month indicates origination of the transaction. All specifications include investor, firm, month of origination, and CEO ethnicity fixed effects and we control for the value control return on equity (ROE) in the prior 12 month period. Standard errors are clustered at the investor level. The dataset spans January 2006-December 2010.* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

TABLE A4: INVESTOR-FIRM COETHNICITY AND RETURNS: ONE YEAR RETURNS

	(1) One Year Return	(2) One Year Return	(3) One Year Return	(4) One Year Return
CoethnicCEO	-0.00396**			
	(0.00181)			
CEOCoethnicityIndex		-0.00409**		
		(0.00204)		
CoethnicBoard			-0.0454***	
			(0.00234)	
BoardCoethnicityIndex				-0.0193***
				(0.00503)
Value Controls	Yes	Yes	Yes	Yes
Investor FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
CEO Ethnicity FE	Yes	Yes	Yes	Yes
Mean of Dep. Var.	0.0315	0.0294	0.0340	0.0274
R2	0.526	0.518	0.553	0.505
N	220803	323944	152852	348844

The specifications are estimated on investor-firm-month-transaction level data. One Year Return is calculated based on transaction price and the price of last day in the first calendar year. The sample consists of all transactions initiated during the period. The month indicates origination of the transaction. Specifications in both Panel A and Panel B include investor, firm, month, and CEO ethnicity fixed effect. We control for the value control return on equity (ROE) in the prior 12 month period in both panels. Standard errors are clustered at the investor level. The dataset spans January 2006-December 2010. ** $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

TABLE A5: INVESTOR-FIRM COETHNICITY AND INVESTMENT: HETEROGENEITY

	(1) OI	(2) OI	(3) OI	(4) OI
CoethnicCEO	0.0210***			
	(0.00633)			
CoethnicCEO × High Portfolio Value	-0.0192***			
	(0.00698)			
CEOCoethnicityIndex		0.0277***		
		(0.00756)		
CEOCoethnicityIndex × High Portfolio Value		-0.0236***		
		(0.00864)		
CoethnicBoard			0.0870***	
			(0.00772)	
CoethnicBoard × High Portfolio Value			-0.0474***	
			(0.00851)	
BoardCoethnicityIndex				0.258***
				(0.0203)
BoardCoethnicityIndex × High Portfolio Value				-0.218***
				(0.0237)
Value Controls	Yes	Yes	Yes	Yes
Investor FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
CEO Ethnicity FE	Yes	Yes	Yes	Yes
Mean of Dep. Var.	0.128	0.123	0.148	0.119
R2	0.295	0.287	0.310	0.280
N	391886	573366	318789	617276

	(1) OI	(2) OI	(3) OI	(4) OI
CoethnicCEO	0.0360***			
	(0.00611)			
CoethnicCEO × More Experience	-0.0444***			
	(0.00677)			
CEOCoethnicityIndex		0.0382***		
		(0.00728)		
CEOCoethnicityIndex × More Experience		-0.0422***		
		(0.00842)		
CoethnicBoard			0.0995***	
			(0.00720)	
CoethnicBoard × More Experience			-0.0736***	
			(0.00769)	
BoardCoethnicityIndex				0.205***
				(0.0181)
BoardCoethnicityIndex × More Experience				-0.144***
				(0.0198)
Value Controls	Yes	Yes	Yes	Yes
Investor FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
CEO Ethnicity FE	Yes	Yes	Yes	Yes
Mean of Dep. Var.	0.0805	0.0732	0.102	0.0701
R2	0.333	0.328	0.347	0.320
N	409290	600298	332221	645879

The specification is estimated on investor-firm-month-level data. The sample consists of all months in which a trade is made by any investor in any firms stock. Panel A shows the heterogeneous effects of "high" and Panel B shows that of "experience". High Portfolio Value is an indicator that equals 1 if the mean portfolio value over the five years is greater than the median of other accounts. More Experience is an indicator that equals 1 if the number of trades until that month is above the median trades of other accounts. Both panel A and Panel B show the outcome order imbalance, which measures how much the investor net buys or sells a particular firm's stock, as a proportion of the investor's total traded stock of the same stock during the same month. All specifications in both panels include investor, firm, month, and CEO ethnicity fixed effects and we control for the value control return on equity (ROE) in the prior 12 month period. Standard errors are clustered at the investor level. The dataset spans January 2006-December 2010. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

TABLE A6: INVESTOR-FIRM COETHNICITY AND RETURNS: HETEROGENEITY

	(1) Risk-adjusted Returns	(2) Risk-adjusted Returns	(3) Risk-adjusted Returns	(4) Risk-adjusted Returns
CoethnicCEO	-0.0180***			
	(0.00597)			
CoethnicCEO × High Portfolio Value	0.00982			
	(0.00623)			
CEOCoethnicityIndex		-0.0252***		
		(0.00725)		
CEOCoethnicityIndex × High Portfolio Value		0.00776		
		(0.00780)		
CoethnicBoard			-0.0773***	
			(0.00743)	
CoethnicBoard × High Portfolio Value			0.0366***	
			(0.00799)	
BoardCoethnicityIndex				-0.0539***
				(0.0164)
BoardCoethnicityIndex × High Portfolio Value				0.0917***
				(0.0177)
Value Controls	Yes	Yes	Yes	Yes
Investor FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
CEO Ethnicity FE	Yes	Yes	Yes	Yes
Mean of Dep. Var.	0.117	0.0895	0.133	0.0727
R2	0.583	0.567	0.638	0.550
N	216531	317258	177878	341568

	(1) Risk-adjusted Returns	(2) Risk-adjusted Returns	(3) Risk-adjusted Returns	(4) Risk-adjusted Returns
CoethnicCEO	-0.0310***			
	(0.00512)			
CoethnicCEO × More Experience	0.0315***			
	(0.00549)			
CEOCoethnicityIndex		-0.0443***		
		(0.00605)		
CEOCoethnicityIndex × High Portfolio Value		0.0392***		
		(0.00678)		
CoethnicBoard			-0.0822***	
			(0.00621)	
CoethnicBoard × High Portfolio Value			0.0493***	
			(0.00638)	
BoardCoethnicityIndex				-0.00595
				(0.0127)
BoardCoethnicityIndex × High Portfolio Value				0.0272**
				(0.0123)
Value Controls	Yes	Yes	Yes	Yes
Investor FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
CEO Ethnicity FE	Yes	Yes	Yes	Yes
Mean of Dep. Var.	0.117	0.0895	0.133	0.0727
R2	0.583	0.568	0.639	0.550
N	216531	317258	177878	341568

The specification is estimated on investor-firm-month-level data. The sample consists of all months in which a trade is made by any investor in any firms stock. Panel A shows the heterogeneous effects of "high" and Panel B shows that of "experience". High Portfolio Value is an indicator that equals 1 if the mean portfolio value over the five years is greater than the median of other accounts. More Experience is an indicator that equals 1 if the number of trades until that month is above the median trades of other accounts. Both panel A and Panel B show the outcome risk-adjusted returns, which is defined as the difference between the risk unadjusted returns and the treasury bill rates in Kenya, divided by the standard deviation of the difference. All specifications in both panels include investor, firm, month, and CEO ethnicity fixed effects and we control for the value control return on equity (ROE) in the prior 12 month period. Standard errors are clustered at the investor level. The dataset spans January 2006-December 2010. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

A1 Data and variables

A1.1 Data

We use the following data sources. The NSE's Transactions Registry is recorded by the Central Depository and Settlement Corporation, Ltd. (CDSC), the "back office" that manages the clearing and settlement of NSE transactions. The CDSC also maintains a Registry of NSE Investor Accounts. They gave us access to a de-identified version that contains, in addition to a scrambled id, the investor's gender, residential location (typically a town or city), account creation year, account type (individual/institutional investor/broker), nationality (Kenya/East African Community (Burundi, Rwanda, South Sudan, Tanzania, and Uganda)/"foreign"), and last name. Information on firm characteristics (book value, outstanding shares, etc) comes from the firms' financial reports.

A1.2 Variables definition

What we term **Investment**, or holdings imbalance, ranges from 0 to 1. It measures, at the investor-firm-month level, the value of a particular investor's holdings of a particular stock, as a proportion of the value of the investor's total portfolio.

Order Imbalance ranges from -1 to 1. It measures, at the investor-firm-month level, how much the investor net buys or sells a particular firm's stock, as a proportion of the investor's total traded stock of the same stock during the same month (see e.g. Chordia *et al.* , 2002). Specifically,

$$\text{Order Imbalance} = \frac{(\text{Total value of stocks bought}) - (\text{Total value of stock sold})}{\text{Total volume traded within the month}}$$

In the sample of investors who bought and sold the same stocks during our sample period, we define **Risk Unadjusted Returns** as the realized return based on the buy and sell price during the holding period. In the sample of investors who bought but not subsequently sold before the end of our data period, the 31st of December 2010, we compute the **Risk Unadjusted Returns** as unrealized paper returns at the 31st of December 2010.

Sharpe Ratio is defined as the difference between the returns of the investment and the risk-free return, divided by the standard deviation of the difference, which represents the additional amount of return that an investor receives per unit of increase in risk. Specifically,

$$\text{Sharpe Ratio} = \frac{E[R - R_b]}{\sqrt{var[R - R_b]}}$$

where R is the risk unadjusted returns, and R_b is the risk-free return. We use the treasury bill rates in Kenya as the risk-free return here.

CoethnicInvestorBase$_{jt}$ is the portfolio value investors that are active—that is, that trade—at time t and who belong to the same ethnicity as firm j's CEO hold, relative to that of all potentially active coethnic investors. We define potentially active coethnic investors as all investors who are Kenya individual investors and have invested on the NSE up to and including the month in question.

NeutralInvestorBase$_t$ is the portfolio value of neutral investors that are active—that is, that trade—at time t, relative to that of all potentially active investors. We define potentially active investors as all investors who are Kenya individual investors and neutral investors, and have invested on the NSE up to and including the month in question. We proxy for neutral investors with foreign and institutional investors.

Alpha is another risk-adjusted returns we define as abnormal return (alpha) based on standard CAPM. In this specification, the risk-free return is defined as the treasury bill rates in Kenya and the market return is calculated based on the Nairobi Securities Exchange 20 Share Index(NSE20). NSE20 is a major stock market index which tracks the performance of 20 best performing companies listed on the Nairobi Securities Exchange. Then, we estimate β and alpha using the return of each stock, the risk-free return in Kenya, and the market return in Kenya.

A2 Coding ethnicity and coethnicity

We probabilistically assign ethnicities to investors, CEOs, and board-members using their last names. As described in Section 2, the starting point is name×ethnicity match probability information recorded by Yenkey (2015, 2018a,b). The author hired eight Kenyan research assistants (RAs). For each last name, each RA was asked to assign a 1 to any ethnicity that the RA felt 75 percent confident that the name was likely to belong to, and a 0 otherwise. There is overlap in the names used by some ethnicities so that the RAs could assign a given name to multiple ethnicities.[42] We start by taking the average

[42]RAs were asked to do so for the following ethnicities: Anglo, Kalenjin, Kamba, Kikuyu, Kisii, Luhya, Luo, Maasai, Meru, South Asian, Swahili.

of the 1's and 0's across all RAs for each name to arrive at a single number for each name n and ethnicity e, p_{en}.

From this information we need to construct measures of whether an individual investor is likely to be of the same ethnic group as a given CEO and board. We say that ethnicity e is name n's *Likely Ethnicity* if $p_{en} \geq 0.4$ and p_{en} is ≤ 0.3 for all other ethnicities.[43] If this it not true for any ethnicity, n does not have a *Likely Ethnicity*.

As described in Section 2, the first CEO measure, CoethnicCEO$_{ijt}$, is an indicator variable equal to 1 if investor i and the CEO running firm j in month t share a Likely Ethnicity, and 0 if not.

The second CEO coethnicity measures CEOCoethnicityIndex$_{ijt}$ is equal to 1 minus Lieberson (1969)'s index of population diversity, and does not require any subjective cut-off choices such as those discussed above. The measure is described in more detail in Section 2.

The first board measure, BoardCoethnicityIndex$_{ijt}$, is equal to the proportion of board-members that are coethnic with the investor, where coethnicity is measured as for the CoethnicCEO$_{ijt}$. The measure is described in more detail in Section 2.

The other board measure, CoethnicBoard$_{ijt}$, is a 0/1 variable, and essentially repeats the construction of CoethnicCEO$_{ijt}$ twice, first between individual board-members and the investor, then for the board as a whole vis-a-vis the investor. To set CoethnicBoard$_{ijt} = 1$ in month t, we require, first, each individual board-members to be relatively likely to belong to the same ethnicity and relatively unlikely to belong to a different ethnicity than the investor, or vice versa, and second, for the board as a whole—given the expected individual board-member/investor co-ethnicity/non-coethnicity statuses—to be relatively likely to belong to the same ethnicity as the investor and relatively unlikely to belong to another ethnicity.

A3 Robustness checks

In Appendix Table B1 we show that our results from Section 3 of the paper are qualitatively very similar if we vary the thresholds used to define investors' and managers' ethnicities. The coethnicity variables are defined differently than in Table 2: the cut-

[43] These cut-offs were chosen with the goal of minimizing both type 1 and type 2 errors. We also wish to make use of a high proportion of the sample of investors; for this reason the 0.4 threshold is relatively low and the 0.3 threshold relatively high, given considerable overlap in the names used by some Kenyan ethnic groups. In sub-section B1 of this appendix we show that our results are qualitatively very similar if we vary the thresholds.

offs, both to define individual and board level ethnicity are a high of 0.3 and low of 0.2, compared to 0.4 and 0.3, respectively in the main analysis

In Appendix Table B2 we restrict our sample to investors who open their stock market accounts during our data period so that we have their full transaction history after the account opening. We find that the results are similar to Table 2. The results imply that lack of transaction history for investors before 2006 will be unlikely to affect our results.

In Appendix Table A2 we show that the results are very similar to those in Table 4 if we restrict our sample to investors who bought and sold during our sample period and study the relationship between coethnicity and realized returns. In Appendix Table A3, we restrict the sample to firms whose CEO ethnicity remains constant during our data period. The results show that for these firms the estimated differential return on coethnic investments cannot be due to any stock price dynamics associated with CEO (ethnicity) turnover.

To investigate returns over different horizons, in Appendix Table A4, we show the relationship between coethnicity and one year return. One year return is calculated based on transaction price and the price of last day in the first calendar year. It captures the performance of the transaction in the first calender year. We show that the results is similar with our main Table 4. We also investigate very short-run (1-day and 5-day) returns on coethnic investments in Appendix Table B3. We find that the one- and five-day return on coethnic investments is—in terms of point estimates—extremely close to that of non-coethnic investments. The only somewhat larger and statistically significant difference we find is for CoethnicBoard measure, which is lower for coethnic investments.

We also investigate heterogeneoue effects in Appendix Table. In Appendix Table A5 we show that both high-portfolio-value and highly experienced investors favor coethnic firms much less—indeed, they tend not to discriminate on the basis of firms' ethnicity—than other individual investors do. In Appendix Table A6, we show that both high-portfolio-value and highly experienced investors tend not to earn lower risk-adjusted returns on their coethnic investments. The result also highlights that inexperienced investors contribute lower returns in the market.

In Appendix Table B4, we define our risk-adjusted returns as abnormal return (alpha) based on standard CAPM. We estimate β and alpha using the return of each stock, the risk-free return in Kenya, and the market return in Kenya. The risk-free return is

defined as the treasury bill rates in Kenya and the market return is calculated based on the Nairobi Securities Exchange 20 Share Index(NSE20). NSE20 is a major stock market index which tracks the performance of 20 best performing companies listed on the Nairobi Securities Exchange. We show that the results are similar to those in Table 4.

A4 Proof of propositions

A4.1 Proof of Proposition 1

Proof. Taking derivatives of p_1 with respect to β gives:

$$\frac{\sigma^2(1-\rho^2)(1-\alpha)}{I\tau A^2}\{N_1(1-\beta)[\alpha+\alpha(1-\alpha)(1-2\beta)+(1-\beta)(1-\alpha)^2(1-\rho^2)^2] \\ +(1-\alpha)(1-2\beta)\rho\alpha N_2\}$$

which is positive if and only if

$$N_1 > \frac{(2\beta-1)\rho\alpha(1-\alpha)N_2}{\alpha+\alpha(1-\alpha)(1-2\beta)+(1-\beta)(1-\alpha)^2(1-\rho^2)^2} \tag{10}$$

□

Inequality (10) holds for a wide range of parameters, including for example when the prices of the two types of stocks are uncorrelated.

A4.2 Proof of Proposition 2

Proof. Let ΔN denote the number of shares issued by the firm and suppose $\beta > \frac{1}{2}$. The stock price for the firm before the CEO switch is simply p_2. The stock price after the switch is

$$\tilde{p_1} = \mu - \frac{\sigma^2[(N_1+\Delta N)(1-\rho^2)(1-\beta)(1-\alpha)+\alpha(N_1+N_2+\Delta N(1-\rho))]}{I\tau A}$$

The firm benefits from the switch if and only if $\tilde{p_1} > p_2$, that is

$$N_2 > \frac{(1+\rho)(1-\alpha)(1-\beta)+\alpha}{(1+\rho)(1-\alpha)\beta+\alpha}(N_1+\Delta N) \tag{11}$$

□

Inequality (11) is more likely to hold when N_2, the total outstanding shares of minority-ethnicity firms, is large compared to $N_1 + \Delta N$, the sum of outstanding shares of majority firms and the switching firm, and when β is large. When N_2 is large relative to N_1 and when β is large, the stock price for type 1 firms tends to be higher than that for type 2 firms before the ethnicity switch. In this case there is greater demand for the stocks of type 1 firms and relatively smaller supply. Moreover, when ΔN is small, the additional supply of stocks of type 1 firms is marginal, so the switch won't reduce the stock price for type 1 firms by much.

A4.3 Proof of Proposition 3

Proof.

$$\begin{aligned}
\frac{\partial N_1 p_1 + N_2 p_2}{\partial \alpha} =& \frac{\sigma^2(1-\rho^2)}{I\tau A^2}\{[(1-\beta)N_1^2 + \beta N_2^2][1-(1-\rho^2)\beta(1-\beta)(1-\alpha)^2] \\
& - (N_1^2 + 2N_1N_2\rho + N_2^2)\beta(1-\beta)(1-\alpha^2)\} \\
=& \frac{\sigma^2(1-\rho^2)}{I\tau A^2} M \\
\frac{\partial M}{\partial \alpha} =& 2[(1-\beta)N_1^2 + \beta N_2^2](1-\rho^2)\beta(1-\beta)(1-\alpha) \\
& + 2\alpha(N_1^2 + 2N_1N_2\rho + N_2^2)\beta(1-\beta) \\
\geq& 0
\end{aligned}$$

To prove $M \geq 0$, it suffices to show $M \geq 0$ when $\alpha = 0$.

$$\begin{aligned}
M|_{\alpha=0} =& (1-\beta)^2[1-(1-\rho^2)\beta](N_1 - \frac{N_2\rho\beta}{(1-\beta)[1-(1-\rho^2)\beta]})^2 \\
& + \frac{N_2^2\beta^3(1-\beta)(1-\rho^2)^2}{1-(1-\rho^2)\beta} \\
\geq& 0
\end{aligned}$$

□

A4.4 Proof of Proposition 4

Proof.

$$\begin{aligned}\frac{\partial P_1}{\partial \alpha} =& \frac{\sigma^2}{I\tau A^2}\{N_1(1-\rho^2)(1-\beta)[1-(1-\rho^2)\beta(1-\beta)(1-\alpha)^2]- \\ & (N_1+N_2\rho)(1-\rho^2)\beta(1-\beta)(1-\alpha^2)\} \\ \frac{\partial P_2}{\partial \alpha} =& \frac{\sigma^2}{I\tau A^2}\{N_2(1-\rho^2)\beta[1-(1-\rho^2)\beta(1-\beta)(1-\alpha)^2]- \\ & (N_1\rho+N_2)(1-\rho^2)\beta(1-\beta)(1-\alpha^2)\}\end{aligned}$$

$\frac{\partial P_1}{\partial \alpha} > \frac{\partial P_2}{\partial \alpha}$ if and only if the following inequality holds:

$$\begin{aligned}& N_1(1-\beta)[1-(1-\rho^2)\beta(1-\beta)(1-\alpha)^2-\beta(1-\rho)(1-\alpha^2)] \\ >& N_2\beta[1-(1-\rho^2)\beta(1-\beta)(1-\alpha)^2-(1-\beta)(1-\rho)(1-\alpha^2)]\end{aligned}$$

If $N_1 = N_2$ the condition can be simplified to $\beta < \frac{1}{2}$ □

A5 Alternative Parametrization

The model and propositions above correspond most directly to a situation in which investors' bias is is observable. But even in the case where only ethnicity is observable, the main results of our model still hold. To see this, it's more convenient to reparametrize the model in the following way.

As before, let I denote the total number of investors. But we group investors by their ethnicity first this time. Let α' denote the share of all investors that belong to ethnic group 1 and β_i the share of type i investors that are neutral. The reparametrization can thus be summarized by

$$\begin{aligned}\alpha &= \alpha'\beta_1 + (1-\alpha')\beta_2 \\ \beta &= \frac{\alpha'(1-\beta_1)}{1-\alpha'\beta_1-(1-\alpha')\beta_2}\end{aligned}$$

With no other information, we assume the proportion of biased investors is the same across different ethnic groups, i.e., $\beta_1 = \beta_2 = \beta'$. Thus the reparametrization can be

simply given by

$$\alpha = \beta'$$
$$\beta = \alpha'$$

Given the additional assumption, Proposition 1 above can be interpreted in an alternative manner.

Proposition 5 (Proposition 1′)**.** *The stock price of firms is increasing in the share of total investors who have the same ethnicity as their CEOs under reasonable conditions.*

Proof. In this case, inequality (10) is replaced by

$$N_1 > \frac{(2\alpha' - 1)\rho\beta'(1-\beta')N_2}{\beta' + \beta'(1-\beta')(1-2\alpha') + (1-\alpha')(1-\beta')^2(1-\rho^2)^2}$$

□

A6 Spillovers of changes in firms' ethnicity onto other firms

This section considers spillover effects of changes in firms' ethnicity on *other* firms. In particular, the stocks of the firms of the pre-switch ethnicity may face upward pressure while that of the post-switch ethnicity may face downward pressure, as the supply of similar stocks is lower for the former and higher for the latter after the switch. We run the following regression:

$$\begin{aligned}\text{PriceToBook}_{jt} = \alpha &+ \beta \text{I}(\text{CEO switched} \rightarrow \Delta\text{CoethnicInvestorBase})_{jt} \\ &+ \gamma \text{I}(-j \text{ CEO switched \& } j \text{ of} -j's \text{ post-CEO switch ethnicity})_{jt} \\ &+ \omega \text{I}(-j \text{ CEO switched \& } j \text{ of} -j's \text{ pre-CEO switch ethnicity})_{jt} \\ &+ \delta_j + \theta_t + \varepsilon_{jt}\end{aligned} \tag{12}$$

which broadly follows Crépon *et al.* (2013)'s approach to estimating displacement effects of active labor market policies in France.

$\text{I}(-j \text{ CEO switch \& } j \text{ of} -j's \text{ post-CEO switch ethnicity})_{jt}$ is an indicator that equals one (after the switch) for firm j after another firm $-j$ changes its CEO from another eth-

nicity to someone belonging to firm j's ethnicity. Similarly, I($-j$ CEO switch & j of $-j's$ pre-CEO switch ethnicity)$_{jt}$ equals one (after the switch) for firm j after another firm $-j$ changes its CEO from someone belonging to firm j's ethnicity to someone of another ethnicity. γ and ω thus capture displacement effects across firms of changes in a given firm's ethnicity. Other terms are defined as in (9).

The omitted group consists of firms that do not themselves "change ethnicity" during our data period, and that also do not belong to an ethnicity that sees other firms "joining" or "leaving" the set of firms that share ethnicity with the firm in question during our data period.

As seen in Appendix Table B5, we find no significant evidence of displacement effects on the value of *other* firms of a given firm changing its ethnicity due to CEO turnover and thereby increasing or decreasing the number of firms that belong to the same ethnicity as the other firms in question. However, we appear to lack the power to estimate such spillovers with informative precision, as the estimates are very imprecise.

TABLE B1: INVESTOR-FIRM COETHNICITY AND INVESTMENT: ALTERNATIVE ETHNICITY CODING

	(1) Investment	(2) Investment	(3) Investment	(4) Investment
CoethnicCEO	0.00983***			
	(0.00361)			
CEOCoethnicityIndex		0.0121***		
		(0.00358)		
CoethnicBoard			0.00252	
			(0.00577)	
BoardCoethnicityIndex				0.0166*
				(0.00954)
Value Controls	Yes	Yes	Yes	Yes
Investor FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
CEO Ethnicity FE	Yes	Yes	Yes	Yes
Mean of Dep. Var.	0.554	0.546	0.522	0.543
R2	0.395	0.393	0.446	0.389
N	183754	399457	68062	429519
	(1) OI	(2) OI	(3) OI	(4) OI
CoethnicCEO	0.00309			
	(0.00569)			
CEOCoethnicityIndex		0.0182***		
		(0.00531)		
CoethnicBoard			-0.00563	
			(0.00998)	
BoardCoethnicityIndex				0.0158
				(0.0160)
Value Controls	Yes	Yes	Yes	Yes
Investor FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
CEO Ethnicity FE	Yes	Yes	Yes	Yes
Mean of Dep. Var.	0.0838	0.0731	0.0404	0.0700
R2	0.333	0.325	0.396	0.317
N	274656	602420	109361	648131

The specification is estimated on investor-firm-month-level data. The sample consists of all months in which a trade is made by any investor in any firms stock. The coethnicity variables are defined differently than in table 1 from the main tables. The cutoffs, both to define individual and board level ethnicity are a high of 0.3 and low of 0.2, compared to 0.4 and 0.3, respectively in the main analysis. Panel A shows the outcome investment, which is the proportion of the investors' portfolio that is held in the share. Panel B shows order imbalance, which measures how much the investor net buys or sells a particular firm's stock, as a proportion of the investor's total traded stock of the same stock during the same month. All specifications in both panels include investor, firm, month, and CEO ethnicity fixed effects and we control for the value control return on equity (ROE) in the prior 12 month period. Standard errors are calculated at the investor level. The dataset spans January 2006-December 2010. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

TABLE B2: INVESTOR-FIRM COETHNICITY AND INVESTMENT: NEW INVESTORS

	(1) Investment	(2) Investment	(3) Investment	(4) Investment
CoethnicCEO	0.0146***			
	(0.00359)			
CEOCoethnicityIndex		0.0185***		
		(0.00421)		
CoethnicBoard			0.0202***	
			(0.00442)	
BoardCoethnicityIndex				0.0525***
				(0.00989)
Value Controls	Yes	Yes	Yes	Yes
Investor FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
CEO Ethnicity FE	Yes	Yes	Yes	Yes
Mean of Dep. Var.	0.574	0.570	0.588	0.567
R2	0.400	0.395	0.431	0.391
N	169029	245884	115888	264094
	(1) OI	(2) OI	(3) OI	(4) OI
CoethnicCEO	0.0110**			
	(0.00556)			
CEOCoethnicityIndex		0.0180***		
		(0.00636)		
CoethnicBoard			0.0644***	
			(0.00736)	
BoardCoethnicityIndex				0.112***
				(0.0162)
Value Controls	Yes	Yes	Yes	Yes
Investor FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
CEO Ethnicity FE	Yes	Yes	Yes	Yes
Mean of Dep. Var.	0.0764	0.0667	0.0929	0.0642
R2	0.385	0.379	0.393	0.371
N	259665	380841	178311	408938

The specification is estimated on investor-firm-month-level data. The sample consists of all months in which a trade is made by any investor in any firms stock. The sample is restricted to the investors opening accounts during our sample period so we have the full transaction information of them. Panel A shows the outcome investment, which is the proportion of the investors' portfolio that is held in the share. Panel B shows order imbalance, which measures how much the investor net buys or sells a particular firm's stock, as a proportion of the investor's total traded stock of the same stock during the same month. All specifications in both panels include investor, firm, month, and CEO ethnicity fixed effects and we control for the value control return on equity (ROE) in the prior 12 month period. Standard errors are calculated at the investor level. The dataset spans January 2006-December 2010. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

TABLE B3: INVESTOR-FIRM COETHNICITY AND SHORT-RUN RETURNS: ONE DAY AND FIVE DAY

	(1) Return_1day	(2) Return_1day	(3) Return_1day	(4) Return_1day
CoethnicCEO	0.000198			
	(0.000387)			
CEOCoethnicityIndex		-0.0000294		
		(0.000441)		
CoethnicBoard			-0.00162***	
			(0.000574)	
BoardCoethnicityIndex				-0.000848
				(0.00131)
Value Controls	Yes	Yes	Yes	Yes
Investor FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
CEO Ethnicity FE	Yes	Yes	Yes	Yes
Mean of Dep. Var.	0.00137	0.00100	0.00165	0.000954
R2	0.375	0.370	0.396	0.359
N	363846	523631	245584	558158
	(1) Return_5day	(2) Return_5day	(3) Return_5day	(4) Return_5day
CoethnicCEO	0.0000267			
	(0.000599)			
CEOCoethnicityIndex		0.000331		
		(0.000685)		
CoethnicBoard			0.000401	
			(0.000824)	
BoardCoethnicityIndex				0.000540
				(0.00178)
Value Controls	Yes	Yes	Yes	Yes
Investor FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
CEO Ethnicity FE	Yes	Yes	Yes	Yes
Mean of Dep. Var.	0.00241	0.00165	0.00202	0.00158
R2	0.370	0.367	0.402	0.356
N	259727	375811	173719	400434

The specifications are estimated on investor-firm-month-transaction level data. We calculate Returns_1day using the price of the ticker 1 day from the transaction date divided by the price of the buying transaction, and Returns_5day using the price of the ticker 5 days from the transaction date divided by the price of the buying transaction. The sample consists of all transactions initiated during the period. The month indicates origination of the transaction. Any investor may have multiple transactions for a given firms stock in a given month, if there are different shares bought are sold in multiple different future months and thus may result in varying returns. The sample includes both transactions that were closed(sold in full) during the period, as well as those open at the end of the period. For those open at the end of the period, we assume the transactions were closed in the last month. Specifications in both Panel A and Panel B include investor, firm, month, and CEO ethnicity fixed effect. We control for the value control return on equity (ROE) in the prior 12 month period in both panels. Standard errors are clustered at the investor level. The dataset spans January 2006-December 2010. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

TABLE B4: INVESTOR-FIRM COETHNICITY AND RETURNS: ALPHA

	(1) Risk-adjusted Returns	(2) Risk-adjusted Returns	(3) Risk-adjusted Returns	(4) Risk-adjusted Returns
CoethnicCEO	-0.00109			
	(0.000845)			
CEOCoethnicityIndex		-0.00145		
		(0.000998)		
CoethnicBoard			-0.0147***	
			(0.00112)	
BoardCoethnicityIndex				-0.0190***
				(0.00216)
Value Controls	Yes	Yes	Yes	Yes
Investor FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
CEO Ethnicity FE	Yes	Yes	Yes	Yes
Mean of Dep. Var.	0.00256	0.00312	0.00998	0.00310
R2	0.607	0.618	0.673	0.619
N	216214	318295	150788	342721

The specifications are estimated on investor-firm-month-transaction level data. Risk-adjusted returns is abnormal return (alpha) based on CAPM, where the risk-free return is defined as the treasury bill rates in Kenya and the market return is defined as NSE20 (the Nairobi Securities Exchange 20 Share Index). The sample consists of all transactions initiated during the period. The month indicates origination of the transaction. All specifications include investor, firm, month, and CEO ethnicity fixed effects. We control for the value control return on equity (ROE) in the prior 12 month period in both panels. Standard errors are clustered at the investor level. The dataset spans January 2006-December 2010. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

TABLE B5: AGGREGATE CONSEQUENCES OF COETHNIC INVESTING: EFFECT OF CHANGES IN FIRM ETHNICITY, ALLOWING FOR SPILLOVERS ONTO OTHER FIRMS

	CEO switch → Investor base ↑	CEO switch → Investor base ↓
	(1)	(2)
	Log Price-to-book	Log Price-to-book
I(CEO switched → Δ CoethnicInvestorBase)	0.347***	-0.241**
	(0.127)	(0.108)
I(Other firm of post-CEO switch ethnicity) × post-switch	0.243	0.0408
	(0.149)	(0.0559)
I(Other firm of pre-CEO switch ethnicity) × post-switch	-0.379	-0.00349
	(0.226)	(0.0553)
Value Controls	Yes	Yes
Month FE	Yes	Yes
Firm FE	Yes	Yes
Mean of Dep. Var.	0.966	0.802
R2	0.821	0.849
N	1655	2319

The specifications are estimated on firm-month level data. All specifications include firm and month fixed effects. These estimates look at the effects of possible 'spillover' effects. First switched CEO is an indicator equal to 1 if the ethnicity of the firm CEOs change during the period. Investor base size has the sme definition as in the top panel. Post switch is an indicator equal to one after the change in CEOs. Other firm of post-CEO swtich ethnicity is an indcator for all firms with CEOs having the same ethnicity as that of the new CEO, and other firm of pre-CEO switch ethnicity is an indicator for all firms with CEOs having the same ethnicity of as that of the old CEO. The sample looks at a 12 month window around the swtich, 6 months prior and 6 months following. Col (1) limits the sample to those firms in which the new CEO has a higher investor base size than the old CEO, and col (2) limits the sample to those firms in which the new CEO has a lower invester base size than the old CEO. All specifications include firm and month fixed effects and we control for the value control return on equity (ROE) in the prior 12 month period. Stardard errors are clustered at the firm level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$