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Stock markets and female participation in the labor force

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ABSTRACT

This paper examines the relation between female participation in the labor force and stock market trading volume. We focus on the first teaching day of the year at kindergartens and primary schools, treating it as an event with characteristics that resemble an exogenous event, and verify this using a web-based survey. We find that the first day of school has lower trading volume than the average daily trading volume during the rest of the year. Moreover, we document that female workforce participation is negatively associated with the trading volume on this day and that, in societies that have legislated gender nondiscrimination laws that govern hiring, this negative effect is even more pronounced. Our main findings document a significant societal phenomenon with a profound effect on stock markets, and specifically on the quality of the information environment, and therefore merit further attention.

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1. Introduction

The increase in female participation in the labor force has been one of the most significant developments in the global economy over the last few decades (Eckstein & Lifshitz, 2011; OECD, 2012). While this increase has been neither linear nor uniform across countries and depends on the social norms and traditions of each society (OECD, 2014), its effects across the globe have attracted interest from academics, politicians, policymakers, and social organizations. The literature has documented both economic and non-economic activities that have been affected by the change in female labor force participation (e.g., Hausman, 1979; Tam, 2011). Rogers and Youssef (1988) even present a relationship between female involvement in economic activities and improvement in child nutrition and health. In this paper, we focus on an unexplored influence of female labor force participation—its effect on the stock markets. Our findings indicate that changes in female labor force participation have a significant effect on capital markets, both cross-country and over time.

The motivation for this research is rooted in the growing interest in the association between social considerations and stock markets. This interest is amply documented in the literature (see Section 2). Prominent examples include Meir et al. (2016), who find that social factors influence individuals' decisions to participate in the stock market, and Ke (2018), who finds that traditional gender norms are negatively associated with direct household stock market participation. These findings prompt us to explore whether changes in social norms affect additional attributes of the stock market.

In this paper, we conjecture that a change in female participation in the labor force is a result of a change in social norms. In other words, we assume that a change in the traditional duties of males and females within the nuclear family—which is a

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result of a change in the social norms of the society—will lead to an increase in the female labor force participation (for simplicity, we refer to a society with higher gender equality as a society with "modern" norms). It should be noted that the outcome of the change in gender-related social norms is reflected in the higher participation of *both* parents in the economic and non-economic activities of the nuclear family, as both are performing the same duties interchangeably (relative to a more traditional family in which each parent has her/his own duties). That is, a change in the level of female labor force participation implies that, relative to traditional social norms, females (males) are less (more) engaged in households' activities and more (less) engaged in outside employment activities.

Based on this assumption, we hypothesize that a higher gender equality—which is demonstrated in a higher participation of females in the labor force—will cause higher sensitivity of financial markets to cultural- and social-related events and activities (for example, large gatherings of families, such as open houses, festivals, and competitions). That is, in a traditional family, events that relate to the family will affect one of the parents, while, in a modern family, the same event will affect both parents because the dichotomy between the duties of male and females in the latter case is less clear. This will result in a greater effect on capital markets relative to societies in which the traditional male and female duties are preserved. The implication of this hypothesis is that social factors should be considered when studying capital markets.

To examine this research question, we focus on an event that, on average, affects females (both genders) in a society with traditional (modern) social norms: the first teaching day in kindergartens and primary schools (hereafter: "first day of school"). We view the first day of school as a proxy for an exogenous event in which changes in female participation in the labor force are reflected within and across economies. Specifically, higher female participation will increase the involvement and participation of both parents in the new beginning for their children; therefore, trading activity in capital markets is expected to decrease. Hence, we expect to find a negative correlation between female participation in the labor force and trading volume on the first day of school, on average.

To provide observational support for the assumption regarding the participation of both parents in activities on the first day of school, we conduct a cross-country survey. The survey is conducted on Monday, September 2, 2019: the first day of the 2019 school year in most countries in the northern hemisphere. In most countries, the first day of school falls somewhere in early September (in the northern hemisphere) or early March (in the southern hemisphere), although there is considerable national and regional variation. The survey includes 607 anonymous participants from 32 different nations. Overall, more than two-thirds of the participants report that they take some time off work on the first day of the school year. The participants also indicate that 87.7% of their close circle accompany their children to school on that day. There are no gender differences across the participants' answers: 67.33% (202 of 300) of the female participants accompany their children on the first day of school, compared with 67.75% of males (208 of 307 participants). Overall, the survey's findings are consistent with our assumption that both parents are involved in the activities occurring on the first day of school.

To examine the relation between female participation in the labor force and trading activity on the first day of school, we employ a dataset of trading volumes and labor statistics of 74 countries. The sample period spans 1967 to 2018.[1] In the analysis, we normalize the trading volume into two measures in a manner that, regardless of the currency and number of trading days, we are able to compare results across countries (see Section 3 for details).

First, we examine the relation between trading volume on the first day of school compared with the other trading days of the year. As per our hypothesis, we expect to find lower trading volume on the first day of school compared with the rest of the year, because, while it is a regular working day, its importance to family members distracts market participants. Indeed, our analysis shows that, after controlling for country and year fixed effects, trading volume on the first day of school is significantly lower than on the other trading days of the year, on average. This effect disappears in the trading days that follow the first day of school. Moreover, the economic magnitude of this decrease is meaningful: the results demonstrate an average decrease of approximately 12% in trading volume on the first day of school relative to other trading days.

Second, we examine the relation between female participation in the labor force and trading volume on the first day of school, and find a significant negative association This analysis is conducted using annual data, as macro data are measured and reported annually (see Section 3 for details).[2] We find that higher female participation in the labor force in a given society causes lower trading volume on the local stock market on the first day of school. This relation holds for both national and international modeled estimates of female participation rates. To examine the robustness of this negative relation, we control for economic variables that may affect the results, such as gross domestic product (GDP) per capita,[3] the proportion of females with account ownership at a financial institution (or with a mobile money service provider), and the gender ratio at birth, which previous literature suggests is negatively correlated with female labor force participation (Angrist, 2002).[4] Consistent with our hypothesis, the negative correlation between trading volume and female labor force participation on the first day of school is preserved.

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[1] We collect and use the monetary trading volume figures from exchanges, reported in the local currency in which the trading takes place.

[2] Similar to analyses of event studies in the literature, we examine the effect of the first day of school from $t − 1$ to $t + 1$. As a robustness check, we repeat the analysis for day t and $t + 1$, and the results remain qualitatively similar. See Section 3 for additional details.

[3] GDP divided by mid-year population. The data are normalized to constant 2010 US dollars.

[4] The proportion of women with account ownership in a financial institution relates also to an account with a mobile money service provider and relates to the proportion of females in the entire population. Moreover, while we wish to treat this proxy for change in social norms, it has many missing values in the sample. This prevents us from further examining its effect. With respect to gender ratio at birth, we acknowledge that this does not necessarily represent the gender ratio in the labor force or in the entire population. However, as a result of lack of data regarding the latter, we consider the gender ratio at birth an acceptable proxy for the gender ratio of the working-age population.

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Third, we consider an additional aspect of a change in social norms that affects female integration in the labor force—laws that mandate gender nondiscrimination in hiring. Laws enacted by legislative bodies reflect social considerations accepted by the majority of the population. Therefore, the existence of gender nondiscrimination laws indicates a profound shift in social norms compared with "old-style" values. Note, however, that this assumption is stated with caution, as the causality in this case is less direct than the causality we attribute to female workforce participation, as it is based on the notion that politicians should act according to the agenda of their senders. Nevertheless, we employ a dummy variable that indicates the existence of such nondiscrimination law in society and include it in the analysis. Similar to the effect of the female participation rate, we find a significant and negative association between trading volume and the existence of a gender nondiscrimination law. More importantly, the negative effect of the gender nondiscrimination law is above and beyond the effect of female workforce participation. That is, in countries with legislated gender nondiscrimination laws, a higher female participation rate further decreases trading volume on the first day of school.

Finally, we conduct a battery of tests to ascertain the robustness of our findings. First, we control for the possibility that the first day of school is also the first trading day of the week. The literature documents that the first trading day of the week—known as the Monday effect—exhibits a lower trading volume, on average (e.g., Fishe et al., 1993; Lakonishok & Maberly, 1990). Therefore, our findings may (partially) arise from this effect. However, estimation results show otherwise. We begin by confirming that, while the first trading day of the week exhibits lower trading volume, it does not harm the finding that trading days on the first day of school have even lower trading volume. We then verify that, even after controlling for the first trading day of the week, there is a negative and significant relation between both female workforce participation and the existence of nondiscrimination legislation and trading volume during the first day of school. Second, we test the dependence of our findings to geographical location by splitting the sample into the southern and northern hemispheres (in these regions, the first day of school begins in different months). We find that the results still hold in both regions: the first day of school exhibits lower trading volume, and this trading volume is negatively related to female participation in the labor force. Finally, we estimate the effect of female workforce participation on trading volume on the first day of school in each country separately and find that 72% of the countries in our sample have a negative relation between these variables.

As detailed above, we state that the first day of school serves as an exogenous event to examine the relation between social norms and financial markets. While the first day of school is predicted, families rarely outsource their participation in the activities of this day. To rephrase this in financial terms, while the date and the activity of this event are anticipated, the exposure to this activity cannot be mitigated. Moreover, the results of the web-based survey detailed above also support the notion that parents participate in the activities of the first day of school. Such behavior enables us to examine the link between female labor force participation and financial markets both across countries and across time. We should mention, however, that the use of the first day of school has its drawbacks. First, the importance of the first day of school varies across societies. Second, the first day of school is a significant event in households with small children, yet there are many households without small children. Therefore, an insignificant relation between trading volume on the first day of school and female labor force participation does not necessarily imply that the examined relation does not exist. Therefore, our results can be interpreted as a lower bound of the effect of female workforce participation on capital markets.

Our findings contribute to the growing body of evidence that social factors affect capital markets. Traditional asset-pricing models focus on the characteristics of stocks and firms, such as volatility and firm size. We provide additional evidence supporting the notion that factors representing the real economy cannot be ignored when examining a society's capital market, even if such factors are not related to the particulars of a given firm. Moreover, it should be mentioned that trading volume is used as an important indicator of capital markets, as it provides insight into information disclosure (Beaver, 1968), investment decisions, and investor disagreement (Bamber et al., 2011; see Section 2 for details), and may also have implications for a firm's cost of capital (Barron et al., 2005; Verrecchia, 2001).

The remainder of this study is organized as follows. Section 2 reviews the related literature. Section 3 presents the research design and data. Section 4 presents our primary results, and Section 5 tests their robustness. Section 6 presents the results of the web-based survey, and Section 7 concludes.

2. Related literature and research question

There is growing evidence that social factors influence capital markets. One prominent example is stock market participation, which relates to trading volume, as higher market participation implies a higher trading volume. In this respect, Ke (2018) finds that the prevailing gender norms of a society are an important cultural factor. In a cross-country analysis, he finds that traditional gender norms are negatively associated with direct household stock market participation. Further, Ke (2020) analyzes microdata from a United States (US) survey and finds that households with husbands with financial knowledge participate more in the stock market than do households with wives with equal financial knowledge. Guiso et al. (2008) study the effect of a general lack of trust on stock market participation. They show that investors factor the risk of being cheated into the decision to buy stocks. Moreover, the authors find evidence for cross-country variation that is consistent with lack of trust being an important factor in explaining limited participation in stock markets. Additional papers relate stock market participation to IQ level (Grinblatt et al., 2011), social engagement (Changwony et al., 2015), community effects (Brown et al., 2008), financial literacy (Meir et al., 2016; Van Rooij et al., 2011), political activism (Bonaparte & Kumar, 2013), personality traits (Conlin et al., 2015), and corporate scandals (Giannetti & Wang, 2016).

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In this paper, we examine whether societal norms affect capital markets. Based on previous literature, we conjuncture that asset-pricing models should account for societal aspects and not only for characteristics of stocks and firms, such as volatility and firm size. To examine this research question, we refer to female participation in the labor force as a characteristic that reflects the gender-related norms of a society. Shifts in the traditional duties of men and women in a nuclear family represent shifting social norms, which are further reflected in a rising female labor force participation rate. Specifically, a higher level of gender equality will be reflected in greater participation by *both* parents in the family's economic and non-economic activities. Therefore, relative to a society where the traditional duties of males and females are preserved, we expect to find a higher reaction of economic activity to social interactions. As a result, family-related events will affect both parents and will also alter capital markets.

Female participation in the labor force is an important factor in societies, both in economic terms and at the individual level (Doepke & Tertilt, 2009; OECD, 2014). Higher female participation in the workforce has a significant effect on the economy, which includes increased levels of human capital and labor productivity, a more competitive labor market, and productivity gains (OECD, 2012; 2014). Female participation in the labor force is also one of the key contributors to gender equality. At the individual level, the participation of women in economic activities provides them with greater access to and control over resources, while increasing their bargaining power in nuclear families and in society as a whole (OECD, 2014). Moreover, there is evidence that a higher female participation rate leads to greater welfare for these women's children. Qian (2008) shows that increased female income improves the education and health of their children, while Rogers and Youssef (1988) show a relation between female involvement in economic activities and improvements in child nutrition and health.

The literature also contains evidence that female participation in the labor force has a positive effect on female participation in financial decisions and investment activity. Bernasek and Bajtelsmit (2002) link female participation in the labor force with increased levels of female involvement in financial decisions in the US. They find a positive and significant association between a woman's involvement in financial decisions and her share of the household income. These findings imply that higher female participation signals greater involvement in the stock market. Sierminska et al. (2018) offer further evidence in this direction. Based on data from Germany over the period 2002 to 2012, they show that higher participation of women in the labor force and the occupational structure of female employment has a positive effect on women's ability to accumulate wealth.[5]

To examine whether female participation in the labor force affect capital markets, we focus on the first teaching day in kindergartens and primary schools (i.e., the first day of school). In the northern/southern hemisphere, the first day of school is typically around early September/early March. We use this day as a proxy for an event in which changes in female labor force participation are reflected within and across economies. Specifically, in the case of a change in social norms, which results in greater female labor force participation, both parents' involvement and participation in what is a new beginning for their children will increase; therefore, trading activity on this day is expected to fall. Thus, on average, we expect to find a negative relation between female labor participation and trading volume on the first day of school.

Our empirical examination includes several tests. The first examines whether trading volume decreases on the first day of school. We also examine the trading day before the first day of school and several trading days following to show that the effect is restricted to that specific day. The second test examines the correlation between female labor force participation and trading volume on the first day of school. To test this relationship, we employ both national and international modeled estimates of female participation rates, while controlling for economic variables that may affect the results, such as GDP per capita, the proportion of females with account ownership at a financial institution (or with a mobile money service provider), and the gender ratio at birth, which previous literature suggests is negatively correlated with female labor force participation (Angrist, 2002). The third test relates to a specific aspect of changing societal norms, which is reflected in laws that mandate gender nondiscrimination in hiring. Laws enacted by a legislative body typically reflect societal considerations that are accepted by the majority of the population. Therefore, gender nondiscrimination laws that govern hiring demonstrate a profound change in the norms of a given society, which views female participation in the workforce as something desirable.

Finally, while this paper focuses on the effect of social norms on capital markets, it is important to acknowledge the significance of trading volume to financial activity. Trading volume is an important capital markets indicator. It has the potential to capture unique insights regarding information disclosure, such as investors' expectations and investment decisions (e.g., Bamber et al., 2011; Beaver, 1968), and is used to measure informational differences that lead to diverging opinions among investors (e.g., Abudy & Shust, 2020), which in turn may influence the cost of capital (Barron et al., 2005; Verrecchia, 2001). Empirical evidence even suggests that the reaction of trading volume to financial disclosures is more readily detectable than price reactions (Cready & Hurtt, 2002). Hence, factors that affect trading volume are of interest to academics, practitioners, and policy makers.

3. Data and methodology

We collect data on trading volumes at 79 stock exchanges, as well as statistics on the labor force in 74 countries. Our sample period starts in 1967 and ends in 2018. Trading volume data are obtained from Datastream: we collect the monetary

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[5] There is also evidence that females are closer to rational decision-making than men—see Be'eri et al. (2019).

trading volume of each exchange in the currency in which it trades. Statistics on labor are obtained from the World Bank and include annual data on female labor force participation from two sources: the World Bank's estimates and data reported by the countries themselves (and subsequently collected by the World Bank).[6] Finally, we record the starting date for schools and kindergartens, gathered from a variety of governmental, academic, and news sources.

We employ two trading volume measures in our analysis, which normalizes the daily volume of each country. The first measure is the percentage daily trading volume (PDV), calculated as the daily trading volume divided by the annual trading volume for each exchange. Per annum, the sum of this measure amounts to 100%. Formally, PDV is defined per annum as:

$$PDV_{i,t} = \frac{\text{Trading volume of country i on day } t}{\text{Annual trading volume of country i}}$$

The second measure is the relative daily trading volume (RDV), calculated as the daily trading volume divided by the average daily trading volume per annum for each exchange. Formally, RDV is defined per annum as:

$$RDV_{i,t} = \frac{\text{Trading volume of country } i \text{ on day } t}{\text{Average daily trading volume of country i}}$$

An RDV value above (below) 1 means that the trading volume on a specific day is above (below) the daily average. In all of our analyses, we winsorize these variables at 5% (2.5% on each side).

We begin the analysis by examining the trading volume on the first day of school. This test seeks to check whether the trading volume on the first day of school is smaller than the trading volume on other trading days throughout the year. In the financial literature, many papers examine the outcome of a certain phenomenon that occurs on a single day or a single event. This practice is even more prevalent in behavioral finance. For example, Frieder and Subrahmanyam (2004) study the effects of religious holidays, such as St Patrick's Day and the Jewish High Holy Days; Abudy et al. (2021) investigate the stock market reaction to a change in investor mood following the Eurovision Song Contest; Białkowski et al. (2012) study the effect of the Ramadan on stock markets; and Mugerman et al. (2020) investigate changes to and from daylight savings time. All these events relate to a single day per year.

Formally, we employ the following regressions, examining the effect of a dummy variable representing the first day of school on the daily trading volume at the local stock exchange:

$$PDV_{i,t} = \alpha_0 + \beta_1 * DS_{i,FDS} + \beta_2 * DS_{i,FDS-1} + \sum_{d=3}^{6} \beta_d * DS_{i,FDS+d-2} + \delta_i * Dcountry_i + \theta_t * Dyear_t + \varepsilon_{it} \tag{1}$$

$$RDV_{i,t} = \alpha_0 + \beta_1 * DS_{i,FDS} + \beta_2 * DS_{i,FDS-1} + \sum_{d=3}^{6} \beta_d * DS_{i,FDS+d-2} + \delta_i * Dcountry_i + \theta_t * Dyear_t + \varepsilon_{i,t} \tag{2}$$

where $PDV_{i,t}$ is the percentage of the daily trading volume of exchange i on day t; $RDV_{i,t}$ is the relative daily trading volume of exchange i on day t; $DS_{i,FDS}$ ($DS_{i,FDS-1}$) is an indicator variable that receives a value of 1 for dates on which a school year begins (on the day before the school year starts) in country i, and 0 otherwise;[7] denoting the first school day as day 0, $DS_{i,FDS+d-2}$ is an indicator variable that receives a value of 1 for dates (+1, +2, +3, +4) relative to the start of the school year in country i, and 0 otherwise; $Dcountry_i$ is a dummy variable for country i (country fixed effects); and $Dyear_t$ is a dummy variable for year t (time fixed effects). As a robustness check, we also repeat the analysis with day-of-the-week fixed effects and obtain similar results. Our primary interest is the estimator β_1, which represents the effect of the first day of school/kindergarten on a stock market's trading volume.

Our second test examines the determinants of trading volume during the first day of school. The purpose of this test is to examine whether the variation in trading volume between different countries and across time on the first day of school is affected by female participation in the labor force. In this analysis, we use annual estimations, as our main variables are measured per annum. Moreover, to counteract the possible spillover effects of the examined variable, we use an estimation window of three days for the dependent variable, from $t - 1$ to $t + 1$. Formally, we test the association between stock market trading volume around the first day of school and female workforce participation using the following regression:

$$ARDV_{i,n} = \alpha_0 + \beta_1 * FLFP_{i,n} + \beta_2 * GDP_{i,n} + \beta_3 * SR_{i,n} + \beta_4 * AO_{i,n} + \delta_i * Dcountry_i + \varepsilon_{i,n} \tag{3}$$

where $ARDV_{i,n}$ is the average relative daily trading volume of the stock index on exchange i of year n for periods $t - 1$ and $t + 1$, where time t is the first day of school; and $FLFP_{i,n}$ is the ratio of female labor participation divided by the male labor force participation in economy i on year n (expressed as a percentage). This calculation refers to people aged 15 and older who are economically active—that is, all people who supply labor for the production of goods and services during the specified period. For robustness, we use both the modeled estimate of the International Labor Organization (ILO) and the national estimates of this variable. Further, $GDP_{i,n}$ is the GDP per capita, calculated as the GDP divided by the mid-year population of year n (these data are normalized in constant 2010 US dollars); $SR_{i,n}$ is the gender ratio at birth, which refers to the number of

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[6] We are unable to obtain data for all the countries that span the entire sample period.
[7] Note that the first day of school may occur on different dates in different years in the same country.

male births relative to the number of female births in country i in year n; $AO_{i,n}$ denotes the percentage of female respondents who report having an account (alone or shared with another individual) at a financial institution or using some form of mobile money service in the past 12 months (from age 15 onwards, expressed as a percentage) in country i in year n; and $Dcountry_i$ is a dummy variable for country i (country fixed effects). Our primary interest is the estimator β_1, which shows the effect of female workforce participation on stock market volume around the first day of school. We hypothesize that β_1 will be negative, indicating that a higher female participation rate will cause a lower trading volume on the first day of school.

As another indicator of female participation in economic and social activities, we employ an additional proxy for a society's gender openness—the existence in a given country of gender nondiscrimination legislation (see Appendix A for two examples of such legislation). We add an indicator variable ($GL_{i,n}$) that receives a value of 1 if country i has a law mandating gender nondiscrimination in hiring in year n, and 0 otherwise. Hence, the estimation model is as follows:

$$ARDV_{i,n} = \alpha_0 + \beta_1 * FLFP_{i,n} + \beta_2 * GDP_{i,n} + \beta_3 * SR_{i,n} + \beta_4 * AO_{i,n} + \beta_5 * GL_{i,n} + \delta_i * Dcountry_i + \varepsilon_{i,n} \qquad (4)$$

We expect that both β_1 and β_5 will be negative, as they represent a deeper change in the society. A negative sign for both variables means not only that the country's laws affect stock markets, but also that there is an additional effect caused by the behavior of individuals that lowers the trading volume further still. As a robustness check, the analysis is also conducted with day-of-the-week fixed effects, obtaining similar results.

4. Results

Panel A of Table 1 presents descriptive statistics for the main variables of interest. The first two rows in Panel A report the trading volume measures used in the analysis (as presented in Section 3). Given that the volume distributions contain extreme observations, this variable is winsorized at 5% (i.e., 2.5% on each side). The winsorized variable is reported in Panel A and used in our analysis. As a robustness check, we also winsorize trading volume at 2% (1% on each side) and at 10% (5% on each side). The results for the other two specifications are qualitatively similar.[8] The average (median) female participation rate in the labor force is 70.0% (73.8%). Moreover, there are small differences in the two estimates of female participation rate in the labor force. In addition, gender nondiscrimination laws in hiring are quite prevalent (for cases for which these data exist), with an average of 73%.

Panel B reports the difference in trading volume on the first day of school relative to the trading volume for the rest of the year. FDS is an indicator variable that equals 1 on the first day of school in country i and 0 otherwise. According to Panel B, RDV on the first day of school is significantly lower than RDV for the rest of the trading days, with a t-statistic of 10.6. The meaning of this finding is that the unconditional average daily trading volumes of the stock exchange at the beginning of the school/kindergarten year are significantly lower than the average daily trading volume on trading days during the rest of the year.

We begin our analysis by estimating Eqs. (1) and (2) for all the countries in our sample. Columns (1) and (2) in Table 2 show the estimation results of Eq. (1) and Columns (3) and (4) show the estimation results for Eq. (2). In all regressions, we control for country and year fixed effects. The table shows a statistically significant association between the first day of school and stock market activity on the same trading day. The daily volume during the first day of school drops by more than 10% relative to the daily volume during the rest of the year, on average. To demonstrate further this effect, we focus on Columns (3) and (4), which have a more intuitive interpretation. According to the results in Column (3), trading volume on the first day of school drops by 12.5%, on average.

To gauge the persistence effect of the first day of school, we assign dummy variables to each of the four business days following that first day, and a dummy variable denoting the day before the first school day. The results appear in Column (4). The effect of the first day of school persists at a similar economic magnitude, indicating a drop of 11.5% on this day. Unsurprisingly, the results in Column (4) also document a significant negative effect of the day before the first day of school on trading volume. This effect may be plausibly related to pre-school preparation or to the existence of a vacation on this day. However, note that, although this effect is statistically significant, its economic magnitude is about one-third of the effect of the first day of school (i.e., a decrease of 3.8% relative to a decrease of 11.5%, respectively). Finally, on the days that follow the first school day, there is no statistically significant effect on daily volume. Hence, we conclude that this effect fades away relatively quickly.

The second test we perform focuses on the determinants that affect trading volume on the first day of school, as presented in Eq. (3). The results are reported in Table 3. In the analysis, we focus on a three-day event window ($t - 1$, $t + 1$) around the beginning of the school year, as there are possible spillover effects of the examined variable (see, e.g., Abudy et al., 2020). As a robustness check, we repeat the analysis for day t and $t + 1$ and with day $t - 1$ and t, and the results remain qualitatively similar. In addition, the data for this analysis are obtained on an annual frequency: the trading volume is only for the period of the first day of school, and so are the data obtained from the World Bank—female labor force participation, GDP, proportion of bank accounts owned by women, and gender ratio at birth.

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[8] Results for the other two specifications are available from the authors upon request.

Table 1

Descriptive statistics. The table reports descriptive statistics for the sample. The sample period is 1967–2018. The sample includes data on trading volumes at 79 stock exchanges and statistics on the labor force in 74 countries. The stock market returns are winsorized at the 5% level (2.5% on each side). *PDV* is the percentage daily trading volume, calculated as the daily trading volume divided by the annual trading volume for each exchange. *RDV* is the relative daily trading volume, calculated as the daily trading volume divided by the average daily trading volume per annum for each exchange. *Ratio of female to male (%), ILO estimate* is an estimation of the ILO for the ratio of female labor participation divided by the male labor force participation of people aged 15 and older who are economically active. *Ratio of female to male (%), national estimate* is an estimation of the country for the ratio of female labor participation divided by the male labor force participation of people aged 15 and older who are economically active. *GDP* is the GDP per capita, calculated as the GDP divided by the mid-year annual population and normalized in constant 2010 US dollars. *Account ownership, female* is the percentage of female respondents who report having an account (alone or shared with another individual) at a financial institution or using some form of mobile money service in the past 12 months (from age 15). *Nondiscrimination laws based on gender in hiring* is a dummy variable that equals 1 if country i has a law mandating gender nondiscrimination in hiring in year n, and 0 otherwise. Panel A provides summary statistics for the trading volume and labor force variables. Panel B reports on the difference in daily trading volume on the first day of school relative to the daily trading volume for the rest of the year.

Panel A

Variable	Obs.	Median	Mean	SD	Minimum	Maximum
PDV (winsorized at 5%)	473,842	0.35%	0.38%	0.20%	0.05%	1.04%
RDV (winsorized at 5%)	473,842	0.88	0.94	0.49	0.12	2.46
Labor force participation rate: Ratio of female to male (%), ILO estimate	2566	73.76	68.98	15.32	21.77	90.35
Labor force participation rate: Ratio of female to male (%) – national estimate	1935	73.53	70.18	13.42	23.83	94.05
GDP per capita (constant 2010 US$, K)	3358	8.55	17.40	18.86	0.25	111.96
Gender ratio at birth (male per female births)	1566	1.06	1.06	0.02	1.03	1.17
Account ownership, female (% of population ages 15 +)	267	76.25	69.79	27.08	2.95	100.00
Nondiscrimination laws based on gender in hiring (1 = yes; 0 = no)	1799	1	0.73	0.44	0	1

Panel B

Trading Volume	Number of Observations	Mean	Standard Err	t-stat
RDV, Unconditional	473,842	0.94	0.0007	
RDV|FDS=0	472,199	0.94	0.0007	
RDV|FDS =1	1,643	0.81	0.0109	
Difference		0.13		**10.6**

Table 2

Trading volume on the first day of school. The table reports the estimation results of Eqs. (1) and (2). Columns (1) and (2) in Table 2 show the estimation results of Eq. (1) and Columns (3) and (4) show the estimation results for Eq. (2). The sample is defined in Table 1. All specifications control for country and year fixed effects.

	PDV		RDV	
	(1)	(2)	(3)	(4)
First day of school (indicator)	−0.050 (0.005***)	−0.046 (0.008***)	−0.125 (0.012***)	−0.115 (0.019***)
The day before the first day of school (indicator)		−0.015 (0.004***)		−0.038 (0.009***)
Second day of school (indicator)		−0.005 (0.006)		−0.011 (0.017)
Third day of school (indicator)		−0.004 (0.006)		−0.011 (0.015)
Fourth day of school (indicator)		0.006 (0.006)		0.015 (0.014)
Firth day of school (indicator)		−0.004 (0.004)		−0.011 (0.011)
Calendar year fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Number of observations	473,842	473,842	473,842	473,842
Adjusted R²	2.99%	2.99%	2.93%	2.94%

Table 3

Stock markets and female participation in the labor force. The table reports the estimation results of Eq. (3). The dependent variable is ARDV, which is the average of RDV for periods $t − 1$ and $t + 1$ when date t is the first day of school. The sample, independent variables, and RDV are defined in Table 1. In all regressions, we control for country fixed effects.

	(1)	(2)	(3)	(4)	(5)
Ratio of female to male labor force participation rate (%) – modeled ILO estimate	−0.007 (0.001***)		−0.005 (0.001***)	−0.007 (0.002***)	−0.047 (0.012***)
Ratio of female to male labor force participation rate (%) – national estimate		−0.006 (0.001***)			
GDP per capita (constant 2010 US$, K)			−0.002 (0.002)		
Gender ratio at birth (male per female births)				−0.542 (1.961)	
Account ownership, female (% of population ages 15 +)					−0.001 (0.003)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Number of observations	5,862	5,532	5,612	3,252	716
Adjusted R²	5.91%	5.91%	5.70%	6.51%	19.22%

As per the results, the female labor force participation rate (the ratio of female to male labor force participation) for both national and international estimates is negatively related to the trading volume on the first day of school, on average. The economic magnitude of this correlation is as follows: one standard deviation increase in the female labor force participation reduces trading volume by almost 13%. Moreover, this result holds when controlling for GDP per capita, gender ratio at birth, and female account ownership—none of which are statistically significant.

Aiming to further investigate the effect of a change in social norms on capital markets, we incorporate in the analysis an additional variable reflecting a change in societal norms concerning gender equality. This variable relates to the existence of gender nondiscrimination laws that govern hiring practices. Gender nondiscrimination legislation can account for an important explanatory variable, as laws typically reflect consensus between various parts and parties comprising a society. However, we state this assumption with caution, as causality in this case is less evident than the causality we attribute to female workforce participation, as it is based on the notion that politicians should act in accordance with the agenda of their senders. Nevertheless, we believe this variable will also be negatively associated with trading volume.

The results of the analysis, based on Eq. (4), appear in Table 4. As per the results, gender nondiscrimination legislation governing hiring is negatively related to trading volume at the start of the school year. This legislation is associated with a decrease of 15.7% in trading volume, on average. Moreover, our main results from Table 3 still hold—the negative and significant relation between female workforce participation and trading volume is preserved. The interpretation of these findings is that markets with gender nondiscrimination laws governing hiring have a lower trading volume on the first day of school than do markets in countries without such laws. Moreover, trading volume is even lower as the female participation rate in the labor force increases.

Finally, in Fig. 1, we present the t-statistic of β_1 using Eq. (3)—this time estimating the model in each country *separately*. The graph restricts the sample to the estimates with more than 20 observations. Of 57 regressions (for each country) in this sample, 41 β_1 have a negative t-statistic. We perform the binomial proportion test to determine whether the proportion of negative to positive t-statistics in this estimation is random. The test's Z statistic is 2.94, meaning that a plunge in market volumes around the start of school is not random.

5. Robustness tests

In more than half of the observations, the school year starts at the beginning of the trading week. Therefore, as a robustness test, we add a control variable for the first trading day of the week and perform an additional analysis. Formally, Eq. (5) is an extension of Eq. (2), and appears as follows:

$$RDV_{i,t} = \alpha_0 + \beta_1 * DS_{i,FDS} + \beta_2 * DS_{i,FDS-1} + \sum_{d=3}^{6} \beta_d * DS_{i,FDS+d-2} + \beta_7 * FDW_{i,t} + \delta_i * Dcountry_i + \theta_t * Dyear_t + \varepsilon_{i,t} \quad (5)$$

$FDW_{i,t}$ is a dummy variable that equals 1 if the trading day is the first trading day of the week, and 0 otherwise (all other variables are defined in Section 3).

In addition, we add this dummy variable to Eq. (4), which remains one of our main questions of interest—the effect of the female labor force participation rate and the existence of gender nondiscrimination laws governing hiring. Formally, Eq. (6) is:

$$ARDV_{i,n} = \alpha_0 + \beta_1 * FLFP_{i,n} + \beta_2 * GL_{i,n} + \beta_3 * FDW_{i,n} + \delta_i * Dcountry_i + \varepsilon_{i,n} \quad (6)$$

where similar to Eq. (5), $FDW_{i,n}$ is a dummy variable that equals 1 if the first day of school is the first trading day of the week, and 0 otherwise (all other variables are defined in Section 3).

Table 4
Gender nondiscrimination laws and trading volumes. This table reports the estimation results of Eq. (4). The dependent variable is ARDV, defined in Table 3. The sample and the independent variables are defined in Table 1. In all regressions, we control for country fixed effects.

	(1)	(2)	(3)	(4)	(5)
Ratio of female to male labor force participation rate (%) – modeled ILO estimate		−0.007 (0.001***)	−0.006 (0.002***)	−0.008 (0.002***)	−0.049 (0.012***)
Law mandates nondiscrimination based on gender in hiring (1 = yes; 0 = no)	−0.127 (0.056**)	−0.180 (0.057***)	−0.181 (0.062***)	−0.179 (0.066***)	−0.303 (0.130**)
GDP per capita (constant 2010 US$, K)			−0.001 (0.002)		
Gender ratio at birth (male per female births)				−0.613 (1.959)	
Account ownership, female (% of population ages 15 +)					−0.002 (0.003)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Number of observations	6,219	5,862	5,612	3,252	716
Adjusted R²	5.42%	6.06%	5.82%	6.70%	19.77%

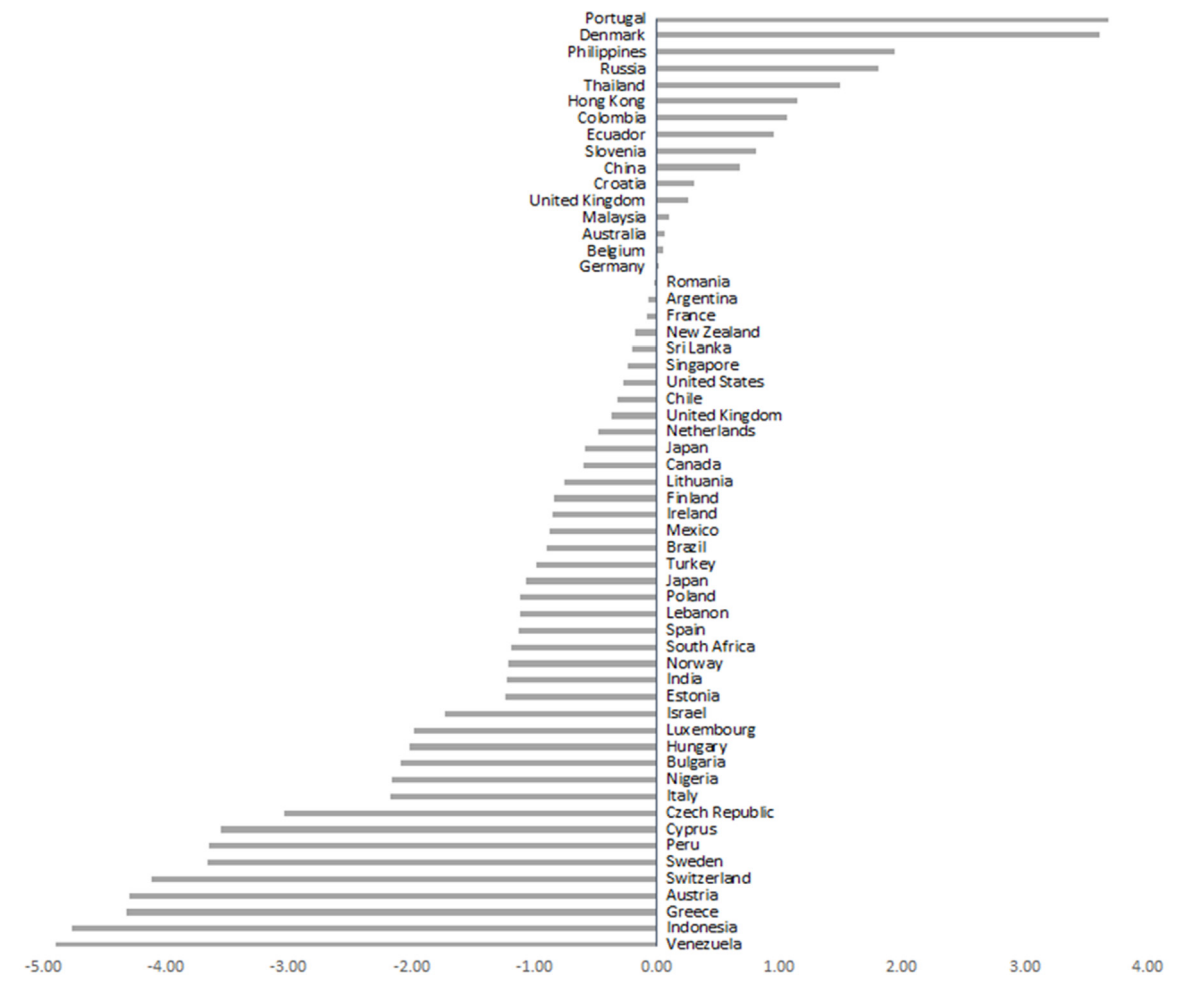*Menachem (Meni) Abudy, Y. Mugerman and Z. Wiener*

Fig. 1. Stock markets and female participation in the labor force, by country estimations. This figure plots the *t*-statistics of the coefficient of β_1 estimated from Eq. (3) regressed on each country separately. The estimate is executed if there are at least 20 observations for the country, which yields a sample of 57 countries.

The results document a significant and negative effect of the first trading day of the week on trading volume (see Table 5). Moreover, when the first trading day of the week is also the first day of school, trading volume is lower compared with the first trading day of the week and the rest of the trading days (see Column [1]). Moreover, the first day of school exhibits a lower trading volume in cases of: higher female labor participation, the existence of gender nondiscrimination laws governing hiring, and the first day of school and first trading day of the week coinciding. As a robustness check, we also repeat the analysis with day-of-the-week fixed effects and obtain similar results.

As an additional robustness test, we split the sample into two: countries where the school year begins in August to October (northern hemisphere) and countries that do not begin the school year during this period (these countries are mostly in the southern hemisphere). We then re-run Eqs. (2) and (4) on each of the subsamples. Columns (1) and (2) (Columns [3] and [4]) of Table 6 present the results for the southern (northern) hemisphere subsample, respectively. The results are qualitatively similar for both subsamples and indicate a lower trading volume on the first day of school in both regions (Columns [1] and [3]). Moreover, the negative and significant relation between female labor participation and gender nondiscrimination laws governing hiring, as well as trading volume on the first day of school, is preserved (Columns [2] and [4]). Again, as a robustness check, we repeat the analysis with day-of-the-week fixed effects and obtain similar results.

6. Qualitative evidence from web survey

Our main hypothesis relies on the assumption that a change in the female workforce participation rate reflects a change in a country's societal norms. The traditional duties of males and females in a nuclear family are evolving, and this would

Table 5

Robustness test—controlling for the first trading day of the week. This table reports the estimation results of Eqs. (5) and (6). Column (1) presents the estimation results of Eq. (5) and Column (2) presents the estimation results for Eq. (6). *FDW* is a dummy variable that equals 1 if the trading day is the first trading day of the week, and 0 otherwise. The sample and all the other variables are defined in Table 1.

	(1)	(2)
Ratio of female to male labor force participation rate (%) – modeled ILO estimate		−0.008 (0.001***)
Law mandates nondiscrimination based on gender in hiring (1 = yes; 0 = no)		−0.177 (0.056***)
First day of school (indicator)	−0.056 (0.019***)	
The first trading day of the week (indicator)	−0.119 (0.002***)	−0.138 (0.014***)
Indicators for days −1,2,3,4,5 around the school year start	Yes	No
Calendar year fixed effects	Yes	No
Country fixed effects	Yes	Yes
Number of observations	473,842	5,862
Adjusted R²	3.86%	7.54%

Table 6

Robustness test—southern/northern-hemisphere subsamples. This table reports the estimation results of Eqs. (2) and (4) on subsamples of the northern and southern hemispheres. Columns (1) and (2) present the estimation results of Eqs. (2) and (4), respectively, on a subsample of northern hemisphere countries. Columns (3) and (4) present the estimation results of Eqs. (2) and (4), respectively, on a subsample of southern hemisphere countries. The sample and all other variables are defined in Table 1.

	(1) Southern	(2)	(3) Northern	(4)
Ratio of female to male labor force participation rate (%) – modeled ILO estimate		−0.006 (0.002**)		−0.009 (0.002***)
Law mandates nondiscrimination based on gender in hiring (1 = yes; 0 = no)		−0.258 (0.083***)		−0.042 (0.087)
First day of school (indicator)	−0.122 (0.035***)		−0.113 (0.023***)	
Indicators for days −1,2,3,4,5 around the school year start	Yes	No	Yes	No
Calendar year fixed effects	Yes	No	Yes	No
Country fixed effects	Yes	Yes	Yes	Yes
Number of observations	164,839	1690	309,003	4172
Adjusted R²	1.93%	6.94%	3.52%	5.74%

affect financial markets. Moreover, we assume that this effect should be reflected in the economic indicators recorded on the first day of school, with both parents taking part in activities related to the school day.

To provide empirical support for our assumption regarding the joint participation of both parents in the activities of the first day of school, we conduct a small cross-country survey. The survey is organized using the Prolific[9] and Qualtrics[10] survey platforms, which are research tools that are commonly used in broad web-based surveys. These platforms have the ability to recruit participants worldwide. The survey is launched on Monday, September 2, 2019 (the first day of the 2019 school year, for most of our sample countries). We employ a closed, fixed-response interview, in which all participants are asked the same set of questions with the same set of multiple-choice answers. The complete survey appears in Appendix B.

We restrict our sample to participants who speak English fluently. A total of 607 anonymous participants are randomly sampled from 32 countries across the globe. Those who agree to participate receive a small reward equivalent to GBP 0.25 for their participation.

According to the results, more than two-thirds of our sample reports taking some time off work on the first day of the school year. This finding is consistent with our assumption that parents do accompany their children to school and do not "outsource" this activity. Further, we ask participants whether members of their community take some time off on that day. According to their answers, 87.7% of their relevant friends and family accompany their children to school on the first day, on average.

Another interesting finding in our sample is that there are no gender differences across participants in terms of accompanying children, with 67.33% (202 of 300) of the female participants accompanying their children on the first day of school, and 67.75% (208 of 307) of male participants. Our conclusion is that the survey supports our assumption that both parents consider the first day of school an important event of their nuclear family. Both parents devote time and effort to participating in the activity that follows this event.

Naturally, the survey has limitations that should be taken into consideration. First, the survey requires knowledge of fluent English and is conducted online. Therefore, it could be biased toward fluent English speakers. Further, since the survey is conducted online, it may also be biased toward participants who own computers, have easier access to online services, are aware of the use of Prolific and Qualtrics, and more frequently use social media. Second, as our analysis is from a macro-level

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[9] https://www.prolific.co/
[10] https://www.qualtrics.com

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perspective, the survey is focused on capturing the social perceptions of its participants and does not explore other micro-level aspects that may also influence their approach, such as socioeconomic level and other demographic characteristics. Third, the survey is conducted in 2019 and thus does not include a time-series perspective—it only reflects social views nowadays.

7. Conclusion

This paper explores whether social norms affect capital markets. The specific social norm we examine is the level of gender equality among males and females in a given society. As a proxy for this norm, we choose to refer to female participation in the labor force. We assume that higher (lower) female participation in the workforce implies a larger (smaller) change in the traditional duties of male and females in a nuclear family. An additional proxy for such a change is the presence of nondiscrimination laws in a society.

To examine whether social norms affect capital markets, we study the relation between female participation in the labor force and trading volume in the stock market. This examination focuses on the first teaching day in kindergartens and primary schools. The first day of school has the characteristics of an exogenous event because, while this event is expected, families rarely "outsource" this activity, and thus do not mitigate its effect. We find that, on average, trading volume on the first day of school is significantly lower than trading volume during the rest of the year (even when we control for the timing of this day). Second, focusing on the first day of school, we find that the decrease in trading volume is negatively related to the level of female workforce participation. This relation is even more pronounced in countries that have legislated gender nondiscrimination laws that govern hiring, which indicates that striving for gender equality is well integrated in that society. Finally, we show that, for the vast majority of countries in our sample, the negative relation between trading volume on the first day of school and female workforce participation holds as well.

Trading volume is an important capital markets indicator, as trading represents a significant economic activity. Understanding the driving factors behind trading volume provides insights into information asymmetry, investor disagreement, and cost of capital. Therefore, revealing additional determinants (and, specifically, local determinants) that affect trading volume has important implications for academics, regulators, and policy makers alike.

CRediT authorship contribution statement

Menachem (Meni) Abudy: Writing - original draft, Validation. **Yevgeny Mugerman:** Data curation, Conceptualization, Methodology, Writing - review & editing. **Zvi Wiener:** Supervision, Funding acquisition.

Appendix A

In this appendix, we present two examples of gender nondiscrimination laws governing hiring practices. The examples are from Russia and Israel, which are part of our sample and also included in the World Bank data.

Russia (2002): An example of a nondiscrimination law in hiring

Everyone has equal opportunities to exercise their labor rights. No one can be limited in labor rights and freedoms or receive any benefits depending on gender, race, skin color, nationality, language, origin, property, family, social and official status, age, place of residence, attitude to religion, beliefs, affiliation or non-affiliation with public associations or any social groups, as well as from other circumstances not related to the business qualities of the employee.

http://www.consultant.ru/document/cons_doc_LAW_34683/0d18caafb87d28222d0cb617c21634cc407ee0f5/

Israel (1988): An example of a nondiscrimination law in hiring

An employer shall not discriminate between its employees or job seekers because of their gender, sexual orientation, personal status, pregnancy, fertility treatments, IVF treatments, being parents, their age, race, religion, nationality, country of origin, place of residence, political views, their service in the reserve, their call to reserve service or their expected service in the reserve service as defined in the Security Service Act (1986), including because of its frequency or duration, within the meaning of the Security Service Act (1986), which is expected of them, in each of the following: (1) hiring; (2) working conditions; (3) job promotion; (4) training or vocational training; (5) dismissals or severance pay.

https://www.nevo.co.il/law_html/law01/p214m1_001.htm#Seif25.

Appendix B

This appendix presents the questions of the web survey (the results are detailed in Section 6).

Page 1:

Welcome to our research study!

In this study, you will be asked to answer a few short questions about yourself and your actions on the first day of the current school year. Your responses are completely anonymous and will only be used for the purpose of academic research.

The study will take approximately one minute to complete, and you will receive £0.20 for your

participation. Your participation in this research is voluntary and you have the right to

withdraw at any given point during the study, for any reason, and without any prejudice.

By clicking the button below, you acknowledge that your participation in the study is voluntary, you are 18 years of age, and you are aware that you may choose to terminate your participation in the study at any time and for any reason.

Please note that this survey will be best displayed on a laptop or desktop computer. Some features may be less compatible for use on a mobile device.

- ○ I consent to participate in the study
- ○ I do **NOT** consent to participate in the study

Page 2:

If the subject is willing to participate, they are asked to enter their Prolific or Qualtrics ID.

Page 3: On this page, the subject is asked to fill in demographic details, and these details are compared with his/her account details. In the case of inconsistency, the subject cannot continue to fill the survey.

What is your gender?

- ○ Male
- ○ Female
- ○ Other

What country do you currently live in? _____

Do you have children?

- ○ Yes
- ○ No

Are you fluent in English?

- ○ Yes
- ○ No

How many years of education do you have? _____

Page 4:

Q#1

Did you accompany someone (e.g., your child, significant other, etc.) to their first day of school this year? (Please select all that apply)

- ○ No
- ○ Yes, to Kindergarten
- ○ Yes, to Elementary School
- ○ Yes, to Middle School
- ○ Yes, to University/College
- ○ Yes, to Vocational School
- ○ Yes, to (fill in where) _____

If the participant does not reply "NO," she/he is transferred to question Q#2. Otherwise, she/he is transferred to Q#3.

Q#2

Did you take time off from work in order to do that?

- ○ Yes, I took the day off
- ○ Yes, I took half a day off
- ○ Yes, I came later than usual
- ○ Yes, I went out earlier than usual
- ○ No, I did not take any time off

Q#3

In your opinion, do most people in your close environment (family, friends, colleagues, etc.) usually accompany someone (e.g., their child, significant other, etc.) to their first day of this school year?

Q#4

You can use the space below for any comments about the study (optional):

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