# Cross-border Marriage and Sex Ratio at Birth: <br> Evidence from Vietnam 

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#### Abstract

Several Asian countries have experienced severe sex ratio imbalances. In order to normalize male-biased ratio, local governments in China and India have offered a cash grant for giving birth to a girl. However, the effect of financial incentive on the sex ratio at birth is not well understood in the literature. This paper investigates how increase in economic value of a daughter affects the sex ratio of infants in Vietnam by exploiting a sharp increase in cross-border marriages. The marriage between Southeast Asian women and East Asian men substantially increased the economic return of having a daughter in Vietnam. Those marriages involve up-front payments for brides' family, which is more than twice the GDP per capita, and also sizeable remittances later. Using nationally representative datasets of Vietnam, we find that the provinces with substantial marriage outflows had seven less boys per hundred girls compared to the other provinces.


## 1 Introduction

Several Asian countries have experienced severe sex ratio imbalances. Being far from the normal range of 104-106 boys to 100 girls, the sex ratio at birth in China was 117 in 2012. The ratios in some Indian states were more masculine in 2011, reaching above 120. This "missing girls" phenomenon can be associated with social problems, such as marriage squeeze and increase in violence and crime by unmarried young men (Das Gupta et al., 2013). To prevent those adverse outcomes, some governments have implemented policies aimed to enhance gender equality and reduce sex selection against girls. One such policy scheme was to provide financial incentives for parents to have daughters. Local governments in India and China ran pilot programs including a cash grant at birth of a girl (Sinha and Yoong (2009), Das Gupta et al. (2013)). However, evidence on the effectiveness of financial incentives to normalize sex ratio at birth is not only thin but also largely inconclusive.

This paper investigates how increase in economic value of a daughter affects the sex ratio of infants in Vietnam, where sharp increase in cross-border marriages substantially changed the expected return from a daughter. In the mid-1990s, cross-border marriages between Vietnamese women and East Asian men rapidly increased. The brides' parents could receive about 1,000-2,000 USD during the marriage process, which was more than twice the GDP per capita of Vietnam in 2004 (Lu, 2005). Moreover, most of the marriage migrant daughters yearly remitted 1,400 USD on average to their natal families, which far outnumbered domestic labor migrants' remittances ( 121 USD). There is qualitative evidence that the possibility of supporting a family by marrying foreign men mitigated son preference in some Vietnamese provinces (Belanger and Linh, 2011).

We hypothesize that the likelihood of having a daughter would be higher in Vietnamese provinces with significant outflows of women to marry East Asian men (affected regions) compared to the other provinces (unaffected regions). We employ the difference-in-differences strategy to exploit time and geographic variations in the number of Vietnamese brides who married East Asian men. Using nationally representative datasets of

Vietnam, we quantitatively find that the higher the number of cross-border marriage in a province was, the lower the sex ratio of infants was. In the affected provinces, there were seven less boys per hundred girls compared to the unaffected provinces after a decade of cross-border marriages. The analysis on the sex ratio by parity also supports our hypothesis.

Our results confirm that financial incentives play a crucial role in determining parents' preference for their child's sex. After sex selection technologies became widely available in Vietnam (Guilmoto et al., 2009), expected return from offspring has become a more important factor for parents to optimize the sex composition of their children. This decision making process can be more pronounced in developing countries like Vietnam because children are often considered as investment goods. Thus, the surge of cross-border marriages in Vietnam raised the expected return of having a daughter, which in turn mitigated male-biased sex ratio in the affected regions.

## 2 Background and Identification

The marriage migration from Vietnam to East Asian countries can be characterized by two features: (1) a rapid and significantly increased outflow of young Vietnamese women (2) from a handful of communities in Southern Vietnam. Marriage migration has increased noticeably since 1993, in which Vietnam and Taiwan agreed on economic cooperation. The agreement incidentally helped to normalize male-biased sex ratio at marriageable ages in Taiwan by tapping a new supply of Vietnamese brides. The number of Vietnamese women married to Taiwanese men sharply increased, reaching 13,000 in 2000. Although the tightening of visa requirement to Vietnamese women in 2005 substantially decreased marriage migration to Taiwan (Edlund et al., 2013), the size of marriage migration from Vietnam may be stable during the 2000s because South Korea, also with male-biased sex ratio, has replaced Taiwanese demand for Vietnamese brides (Figure 1).

Moreover, the origins of brides are found to be highly concentrated in a small number of provinces in the Mekong Delta region (Figure 2). For example, in one rural commune in Can Tho City, 45 percent of marriages in between 1999 and 2003 were cross-border marriages (Belanger and Linh, 2011). We can exploit these substantial differences in outflow intensities across provinces in Vietnam to examine the effect of cross-border marriages on son preference.

Last but not least, the marriage brokering industry in Vietnam, Taiwan and South Korea has played a crucial role in shaping these two unusual patterns in the cross-border marriage. To be specific, since hundreds of institutionalized marriage brokers facilitated cross-border marriages within such a narrow temporal span and confined geographic locations, any significant changes in son preference in the affected regions can be attributed to the effect of cross-border marriages, rather than to other social or cultural changes. In addition, it is noteworthy that many of the brokers usually did start and operate in particular locations, where they had prior business or social networks (Wang and Chang, 2002). Since those brokers did not select into the poorest or most populated communities to recruit brides, those sending provinces were not systemically different from the others in the context of son preference. Thus we can purge the concern of alternative explanations to differently evolving sex ratio of infants in the affected regions.

## 3 Data

Our main datasets are Vietnamese censuses in 1989, 1999 and 2009. Complete birth histories from the censuses allow us to calculate the sex ratio of infants by province level and to compare the ratios by parity. The 1999

Census serves as the baseline before the cross-border marriages accounted for significant fraction of marriages in the sending provinces. The 2009 Census is used for post-treatment analysis. In addition, the comparison between 1989 and 1999 censuses is for a falsification test.

The data from Taipei Economic and Cultural Office (TECO) identify the number of Taiwanese marriage visa issued to Vietnamese women in 2003 by the province level. These numbers scaled by the number of women in marriageable ages in the 1999 Census are used to construct the indicator to identify which provinces were intensively affected by cross-border marriages. Figure 2 shows the intensity of influence by province level. Lastly, we also plan to use the Demographic and Health Survey and the Population Change Survey, which provide relevant variables regarding fertility and family planning to control for other determinants of sex ratio of infants in addition to cross-border marriages.

## 4 Empirical Strategy

We use the surge of female migration for cross-border marriage in Vietnam in the 2000s as a quasi-natural experiment. Since the marriage brokers' decision on initial locations of business was arguably uncorrelated with possible determinants of son preference measured by the sex ratio of infants in Vietnam, if we observe distinctive trends in the ratio of the affected regions then we can attribute them to the effect of cross-border marriage on son preference. We employ difference-in-differences and triple-differences to estimate those effects. To have valid estimations, we compare pre-trends in the sex ratios and other determinants of preference and fertility such as income and parents' education by province. Since a decline in fertility can account for worsening sex ratio of infants (Jayachandran, 2014), we exclude some mountainous provinces to allow similar fertility trends across samples. If there were no strong downward trend in fertility in the 2000s, a significant shift in the sex ratio of infants in the affected regions should be explained by the cross-border marriage. In addition, we can exploit birth histories to derive the likelihood of having an extra son if parents already had two daughters (Almond and Edlund, 2008). Considering the strong preference for at-least-one son in family and readily accessible sex selection technologies in Vietnam (Pham et al., 2012), we can predict that selective abortions in the 2000s might have led to the higher sex ratio of infants at second or third parity in the unaffected regions compared to the ratio in the affected regions.

## 5 Preliminary Results

We find that son preference has abated in the affected regions in three different levels: aggregate level, individual level, and individual level by parity. First, the sex ratio of infants by province level is approximately seven percent lower in the affected regions compared to the unaffected regions in the 2000s (Figure 3). The result indicates that in the affected provinces, there were seven less boys per hundred girls compared to the unaffected provinces after a decade of cross-border marriages.

Secondly, the probability to give birth to a boy is also lower in the affected regions after cross-border marriages constituted a significant outflow of migrants. The size of coefficient (0.01-0.02) is smaller than the aggregate result but still highly significant. The result is robust even when we control for individual characteristics, such as mother's education, mother's age, and mother's marital status. As a robustness check, we added a rural-urban dimension to have triple-difference estimates by using the fact that most marriage migrants were from rural areas. The results corroborate the difference-in-differences estimates.

Lastly, the probability of having a boy at third parity given that parents already had two daughters is 4
percentage points higher in the unaffected regions after the outflows of brides. The sex ratio at third parity conditional on two daughters is in a normal range in the affected regions, whereas the ratio is much more male-biased in the unaffected regions (Figure 4). The probability of having a boy conditional on having one daughter is also lower in the affected regions. The size of difference (one percentage point) is smaller than the case of already having two daughters. However, the coefficient is strongly significant, suggesting weakened son preference in the affected regions.

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## Figures

Figure 1: Trend of Cross-Border Marriage between VN and TW, KR


Figure 2: Intensity of Marriage Outflow by Province


Figure 3: TFR and Sex Ratio Trend in Vietnam


Figure 4: Sex Ratio of Child by Parity


