



ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/raps20

Divorce trends in China across time and space: an update

Mengni Chen, Ester Lucia Rizzi & Paul S. F. Yip

To cite this article: Mengni Chen, Ester Lucia Rizzi & Paul S. F. Yip (2020): Divorce trends in China across time and space: an update, Asian Population Studies, DOI: 10.1080/17441730.2020.1858571

To link to this article: <u>https://doi.org/10.1080/17441730.2020.1858571</u>



Published online: 15 Dec 2020.



Submit your article to this journal 🕝



View related articles



🕖 View Crossmark data 🗹



Check for updates

Divorce trends in China across time and space: an update

Mengni Chen ^[]^{a,b,c}, Ester Lucia Rizzi^d and Paul S. F. Yip^e

^aInstitute for Sociology and Social Psychology (ISS), Cologne University, Cologne, Germany; ^bCentre for Demographic Research, Catholic University of Louvain, Louvain-Ia-Neuve, Belgium; ^cFonds de la Recherche Scientifique, Brussels, Belgium; ^dCenter for Demographic Research, Université Catholique de Louvain, Louvain-Ia-Neuve, Belgium; ^eDepartment of Social Work and Social Administration, The University of Hong Kong, Pokfulam, Hong Kong

ABSTRACT

Despite much attention paid to the surging divorce rate in China. knowledge on divorce patterns and trends at the subnational level is still very limited. This study aims to systematically explore social and economic factors affecting divorce trends between 1990 and 2015 at the provincial level from a tempo-spatial perspective. Traditional fixed effects panel regression and fixed effects spatial autoregression are adopted. Divorce maps demonstrated great variations in the levels and trends of divorce across provinces, highlighting the spatial diversities obscured in the national divorce trend. It is further revealed that factors such as economic development, urbanisation, and employment have augmented their influence over time. Factors that reflect gender equality issues such as the gender gap in education, employment, and sex ratio at birth have different effects across the East, Central and West regions in China. These findings provide insights into the future prospects of divorce in China.

KEYWORDS

China; divorce rate; province; gender equality; socioeconomic; tempospatial

Introduction

China, which previously featured universal marriage and low divorce rates, has been shifting to a society with low marital stability and high divorce rates. The number of divorce cases in China has risen rapidly over the past three decades; from 299,932 in 1979 to 3,636,754 in 2015—almost a 13-fold increase (Ministry of Civil Affairs, 1993, 2016). China's crude divorce rate ('CDR') reached 2.8 (per 1000 people) in 2015 (Ministry of Civil Affairs, 1993), surpassing Japan, South Korea, Taiwan, and many European countries. Costing a mere US\$1.4 for a divorce certificate from the Civil Affairs Bureau, China has become one of the easiest and cheapest countries in the world to divorce (The Economist, 2016). Increasing marital instability and the adverse effects of divorce on the well-being of millions of broken families (especially on the children with divorced parents) have given impetus to the research on divorce in China.

China is a huge country with 1.4 billion people. It has an area of about 9,600,000 square kilometres with 31 provinces located on the mainland consisting of 56 ethnic groups.

CONTACT Mengni Chen Ahfancycmn@gmail.com Institute for Sociology and Social Psychology (ISS), Cologne University, Albertus-Magnus-Platz, Cologne D-50923, Germany

 $\ensuremath{\mathbb{C}}$ 2020 Informa UK Limited, trading as Taylor & Francis Group

From the East coast to the West region, there is great heterogeneity in terms of development and cultural background. Hence, an investigation at the national level may not provide a thorough and deep understanding of the issue of divorce within China. Previous studies have indicated that the divorce rates in China varied across different regions. From the 1982 and 1990 censuses, Zeng and Wu (2000) have observed that divorce rates were lowest in more developed areas along the east coast, and highest in the less developed provinces in northeast and northwest China. Wang and Zhou (2010) discovered that divorce rates were very high in provinces with large-scale population outflow such as Sichuan, Chongqing, and Heilongjiang. Ma et al. (2018) revealed that divorce started to decline in the 2000s in the urban areas whilst continuing to rise in rural areas. Given the increase in the national divorce rate, a tempo-spatial examination of the provincial divorce rate can unveil whether the surge of divorce was national-wide or merely concentrated in some regions.

The divorce rate surge in China is linked to many factors. Dommaraju and Jones (2011) suggested that changes in divorce rates in Asian countries are related to the changes in people's ideation, women's education and economic status, spouse selection, age at marriage, social support to those divorced, and the legal arrangements on divorce. Previous studies have also indicated other contributing factors such as urbanisation (Gao, 2011; Zhang et al., 2014), internal migration (Hu, 2018), the type of union formation (Ma et al., 2018; Zhang, 2017), gender of the children (Zeng et al., 2002), domestic housework division (Platte, 1988), and the income gap between the couples (Zhang, 2015). Although these factors have been identified as potentially responsible for the rising divorce rate in China, very few studies have investigated them from a dynamic and regional perspective. Recent studies imply that the role of the aforementioned factors can change over time and across space, for example the impacts of premarital cohabitation (Ma et al., 2018) and the children's gender (Ma et al., 2019). Therefore, this study takes a tempo-spatial perspective to comprehensively probe the social and economic factors of divorce rates over the period of 1990-2015 at the provincial level. Here, the focus is on macro-level socioeconomic indicators, including economic development, urbanisation, migration, employment, education, gender gap in employment and education attainment as well as the sex ratio at birth.

Background

The rise and fall of divorce rates in China are closely related to the changes in its legal system on divorce (Wang, 2001). The First Marriage Law that was promulgated in 1950 to promote free choice of partners led to a sharp increase in divorce cases and a peak in the CDR of 2.0 (per 1000 people) in 1953 (Platte, 1988). However, during the decade of the Cultural Revolution (i.e., the period of 1966–1976) the divorce rate decreased and reached the bottom level of 0.21 in 1979. The Second Marriage Law, which favoured women in the distribution of property after divorce was issued in 1980. Thereafter, the divorce rate started to rise again—though at a relatively slow pace (Platte, 1988; Wang, 2001). In 2001, the Marriage Law was amended and followed by a large-scale campaign to publicise the law (Sun & Zhao, 2016). This amendment further liberalised divorce by allowing unilateral divorces in circumstances of domestic violence and extramarital relationships (Palmer, 2007; Sun & Zhao, 2016). Since then, the CDR has escalated rapidly—on average by about 0.12 (per 1000 people) per year, in contrast to the

momentum of 0.02 in the period of 1990–2001. In 2003, the Regulation on Marriage Registration removed the requirement of seeking permission from divorcees' employers to get a civil divorce. Consequently, after 2004, civil divorces rose rapidly and outnumbered court divorces (Wan, 2019). Relaxation of legal restrictions over divorce implies that the state is retreating from intervening in marital relationships, and divorce has thus become more of a private and personal decision (Davis, 2014; Yeung & Hu, 2016).

Although the divorce law in China applies to most parts of the nation, in some regions with high proportions of ethnic minority groups such as the five autonomous provinces (e.g., Tibet, Xinjiang, Ningxia, Guangxi, and Inner Mongolia) institutional arrangements are different. For instance, in Xinjiang where the divorce rate is historically high, divorce through religious rituals is common and the court is less restrictive in divorce litigations (Xu & Mao, 2001). In Tibet, the divorce procedure is also quite simple (Zhang, 2010). Once a couple reaches an agreement in the division of custody and property, they can divorce. Apart from the court, parents, friends, and tribal leaders can also adjudicate divorce cases.

Under this changing legal context, we investigate the economic and social factors of the divorce rate in China, expecting that the roles of these factors would be rising while demonstrate some regional differences. In the next section, we review existing literature on factors of our interest.

Literature review

Theoretical framework

Ecological system theory, which explains human behaviour in a multilevel and multidimensional framework, provides a way of understanding how divorce—a kind of individual behaviour—is affected by micro (personal characteristics, e.g., age, gender), meso (community settings, e.g., ethnicity and race composition in the community), and macro factors (national or regional background, e.g., economic development, cultural norms) in a time-based dimension (Bronfenbrenner, 1992, 1995). Here, we pay attention to macro factors and how these factors interact with time and space. These factors include economic development, urbanisation, migration, aggregate rates of employment and education, and gender cultures. These factors can differ based on geographic location and can change over time.

Based on the Second Demographic Transition theory ('SDT'), a position relationship between divorce, economic development and average level of education is expected. According to SDT, as a country develops and personal wealth accumulates, people will shift their focus from material needs to non-material needs (e.g., self-fulfilment, autonomy, emancipation, etc.), which would result in a multitude of family forms and behaviours (Lesthaeghe, 2010). More likely, people with higher education are the vanguard of ideational change and more accommodating of untraditional family behaviours. In a more developed region where the proportion of people with higher education is often larger, modern ideologies and attitudes are more likely to emerge and spread. Therefore, divorce—a kind of behavioural manifestation of new attitudes toward marriage—is more likely to be observed in such a region.

The level of urbanisation and the rate of migration, to some extent, reflect the level of social integration in a society. It is often assumed that social integration increases marital

4 👄 M. CHEN ET AL.

stability via social control and social support (Booth et al., 1991; Finnäs, 1997). Compared to rural areas, urban areas often have higher population mobility, thus having a relatively lower level of social integration. With low social integration, behaviours like divorce that loosen personal bonds are more likely to appear (Shelton, 1987).

The gender culture of a region can be reflected by the gender gap in employment, education, and sex ratio at birth. These macro-level indicators imply the socioeconomic status of women in a society. A smaller gender gap in employment and education, as well as a sex ratio at birth close to normal levels (around 105 boys for 100 girls), means a more gender egalitarian society. According to gender revolution theory (Goldscheider et al., 2015), during the first half of the revolution, women's entry into the labour market and attainment of higher education enables them to leave bad marriages as they gain economic independence; during the second half of revolution, men's entry into the household may stabilise marriage. Although men's time on housework is increasing, the division of housework remains very gendered in China, indicating that China is still in the first half of gender revolution (Zhang, 2017). Therefore, at this stage, women's empowerment in a region is expected to be positively-related to the divorce rate.

The socio-historical time dimension of the ecological system theory implies that macro factors can change and their roles in divorce rates can also evolve over time. To what extent these changes will be observed depends on time frame. For instance, in the 1960s and 1970s when the legal system in China imposed strict restrictions on divorce, socioeconomic factors played a more limited role compared to their roles today. Besides, in a large country like China, socioeconomic changes do not take place at the same time and with the same speed across the country, with some regions developing faster and others slower in a given observation period. Therefore, over the period of 1990–2015, it is expected that the links between socioeconomic factors and divorce rates may vary over time and space.

Altogether, the framework of ecological system, as well as the theories of SDT, social integration and gender revolution have indicated potential associations between the divorce rate and macro indicators of economic development, education, urbanisation, migration and gender cultures. In the next section, we specifically review previous studies and generate hypotheses for each indicator.

Research hypotheses

It has been suggested that economic development in China since its reform and opening up in 1979 is one of the major factors for the surging divorce rates (Wang, 2001; Zeng & Wu, 2000). Based on SDT theory, the hypothesis for economic development is:

Hypothesis 1: Economic development is positively associated with provincial divorce rates.

China's economic success has brought about rapid urbanisation. As divorce is more frequent in urban areas than in the countryside, urbanisation is often believed to be positively related to divorce (Cannon & Gingles, 1956; Glick, 1963; Sandström, 2011). Compare to rural areas, lower cohesion in urban areas reduces the social cost of divorce (Makabe, 1980; Trovato, 1986) and produces more tolerant attitudes toward divorce. By contrast, in rural areas, kinship and the extended family would offer more supervision over marital life in favour of martial stability; therefore, divorcing couples would suffer higher social pressure, cost and stigma (Liao & Heaton, 1992; Zeng et al., 2004). Thus, the hypothesis for urbanisation is:

Hypothesis 2: The level of urbanisation is positively associated with provincial divorce rates.

Urbanisation in China is mainly led by internal migration from the inland rural areas to the coastal urban areas (Zhang & Song, 2003). Trovato (1986) has shown that in Canada, regions with higher rates of population mobility have higher divorce rates, while regions with low migration rates have lower levels of marital dissolution. He explained the result by taking migration as an indicator reflecting rapid social changes, which would weaken the traditional values and norms against divorce. Similar patterns are also observed in China. By mapping the provincial refined divorce rate, Wang and Zhou (2010) have found that divorce was more frequent not only in provinces with large-scale population inflow (such as Beijing and Shanghai) but also in provinces with massive out-migration (such as Sichuan and Chongging). In China, couples involved in migration often live apart from each other and are more likely to be tempted to engage in extramarital relationships (Pan et al., 2004). Long distance from the hometown also keeps the marital relationship away from the intervention of extended family members. Migration can become a proxy for the level of social cohesiveness and cultural attitude toward divorce in a certain province. The more migration (either out-migration or in-migration), the lower the level of social cohesiveness, and the higher tolerance toward divorce. Thus, the hypothesis for migration is as the following:

Hypothesis 3: Provinces with high in-migration or out-migration rates have higher divorce rates.

Over the past 30 years, for both genders in China, the employment and labour force participation rates have been declining (Liu, 2012) because of economic restructuring and expansion of higher education (Giles et al., 2005). Zhang et al. (2014) have found that the urban unemployment rates in China that reflected economic instability had a negative impact on divorce rates during the period of 2000-2011 but have yet to show whether this was due to the decline in male or female employment. Previous studies have consistently shown that male unemployment would increase the risk of divorce as a decrease in male wages and employment will reduce the gain from a marriage, while female unemployment would have the reverse effect, thus reducing the risk of divorce as females would become more dependent and seek financial support within a marriage (Jensen & Smith, 1990; Lewin, 2005; Schaller, 2013). Besides, gender revolution theory suggests that in the first stage of the revolution, female labour force participation contributes to divorce as women are more financially independent, and divorce has become a more affordable choice. This factor is believed to be one of the main driving forces for the rising divorce in China (Zeng & Wu, 2000). Hence, a gender perspective is vital when investigating the relationship between employment and divorce. In this study, not only will the overall employment be investigated, but also the gender difference in the labour market. The hypothesis is:

Hypothesis 4: Higher overall employment rate and larger gender gap in the employment rate are associated with low provincial divorce rates.

6 👄 M. CHEN ET AL.

As aforementioned, declining labour force participation is accompanied by increased enrolment in higher education institutions, especially among young adults. The number of new enrolments in colleges/universities has risen from about 1 million in 1995 to about 10 million in 2016 (Liu, 2012; Ministry of Education, 2016). More highly educated people might be more open to untraditional family behaviours (Cherlin, 2012) and view divorce as a good solution to a bad marriage. It has been shown that better education is associated with higher approval to divorce in China, and women with higher education in younger cohorts have less tolerance toward bad marriages than their counterparts in older cohorts (Yeung & Hu, 2016). The improvement of education in China, especially for women, has contributed to the surge of divorce, not only by cultivating untraditional values toward marriage, but also by enhancing women's socioeconomic status, and raising their bargaining power within the household. Additionally, the rise in female education is part of the gender equity process predicted by the SDT (Lesthaeghe, 2010), contributing to female autonomy and favouring divorce. Wang and Zhou (2010) have found that provinces with higher proportions of college graduates had higher divorce rates, but without further exploring the gender dimension of education. In this study, apart from the overall education situation, the gender gap of education attainment has also been considered. The hypothesis is:

Hypothesis 5: Average education attainment is positively associated with provincial divorce rates while the gender gap of education attainment is negatively associated with provincial divorce rates.

Another factor of divorce which is deeply rooted in the Chinese culture is the gender composition of children. In traditional Chinese society, a husband could divorce his wife on the grounds of failure to produce a son (Liao & Heaton, 1992). Traditionally, the purpose of marriage was not for the happiness of the couple but for producing sons to keep the family name alive (Liao & Heaton, 1992; Xu et al., 2015; Zeng, 1995). Besides, with reference to the Western societies, Morgan et al. (1988) have found that having a son is a protective factor of marriage because fathers are more involved in raising sons and family activities, thus contributing to the wives' marital satisfaction, and lowering the risk of divorce. Many studies have further confirmed that the gender of children still plays an important role in Chinese marriages today, but the impact may vary across regions (Ma et al., 2019; Xu et al., 2015; Zeng et al., 2004). The gender composition of children is generally measured by sex ratio at birth (i.e., the ratio between male births and female births). The hypothesis is:

Hypothesis 6: Sex ratio at birth is negatively associated with provincial divorce rates.

As explained in the Background section, China has relaxed the legal restriction on divorce since 1980, thus creating space for these socioeconomic factors (reviewed above) to play their role in shaping divorce trends. In particular, the roles of these factors may be further augmented after the introduction of unilateral divorces and the removal of seeking permission from divorcees' employers in the early 2000s. China is a huge country with great spatial heterogeneity in economic development and culture. Provinces in the east coastal areas are more developed and modernised. Provinces in the interior area (e.g., in the central and the western) are relatively less developed and more traditional, and they are less influenced by the western culture and values

(Krechetova, 2011; Zhao & Tong, 2000). Wagner and Weiß (2006) have highlighted that the factors of divorce can vary across regions, according to the local socioeconomic and cultural context. Similarly, in the Chinese context, it's possible that predictors of the divorce rate will differ in the Eastern, Central, and Western parts of China. Therefore, we generate two hypotheses for the interaction of socioeconomic factors (including economic development, urbanisation, migration, employment, education, gender gap in the employment and education as well as the sex ratio at birth) with time and regions.

Hypothesis 7: The associations between socioeconomic factors and provincial divorce rates strengthened between 1990 and 2015.

Hypothesis 8: The associations between socioeconomic factors and provincial divorce rates vary across the Eastern, Central, and Western regions.

Data and method

Dependent variable

In this study, the provincial **refined divorce rate** is the dependent variable, referring to the number of divorces per 1,000 married women. Crude divorce rate is not used because previous studies have shown that changes in the married population can seriously distort the crude divorce rates, making it an unreliable indicator to monitor divorce trends (Chen & Yip, 2018; Wang & Zhou, 2010). In this sense, the refined divorce rate, which considers the married population at real risk of divorce, would better reflect divorce trends. The numerator is the number of divorces including the cases registered at the local Civil Affairs Bureau and the cases approved by the local courts. The denominator is the number of married female residents (i.e., the *resident population* of married females) in the province. The data are from the *China Civil Affairs' Statistical Yearbook*, *Tabulations on the 1990*, 2000, 2010 Population Census of the People's Republic of China, and *Tabulations of China 1 per cent Population Sample Survey in 1995*, 2005 and 2015.

Independent variables

Provincial **economic development** is measured by the GDP per capita in constant USD 2,010, according to the data from the China Statistical Yearbook.

Migration is measured by calculating $\left(\frac{\text{resident population}}{\text{hukou population}} - 1\right)*100$. The larger the value, the more inward migration the province has. In this study, the *hukou population* in China refers to the population according to their household registration under the Ministry of Public Security, while the *resident population* refers to the population residing in a place for more than six months. Data of the *hukou population are* from the China Population & Employment Statistics Yearbook, and data of the *resident population* are from the Population Censuses and 1 per cent Population Sample Surveys. This measurement is used for migration because majority of the internal migrants in China move to the host place without changing their *hukou* status (Chan, 2013). To test whether provinces with extensive in-migration or out-migration have different profiles of divorce rates, we also

created a categorical variable, 'migration area'. In-migration areas refer to areas with the value of migration >5.0; out-migration areas refer to areas with the value of migration < -5.0; and the reference is mild-migration areas with the value between—5.0 and 5.0. ± 5.0 has been chosen as the cut-off point to better distinguish provincial migration patterns because most provinces have low levels of migration, valuing between -5.0 and 5.0.

When measuring the provincial level of urbanisation, employment, and education, they are all referred to as situations of the *resident population*. The level of **urbanisation** is measured by the proportion of the urban residents (i.e., those residents living in an officially designated 'urban area') in the total *resident population* with the data extracted from the China Population & Employment Statistics Yearbook.

The overall **employment** situation in a province is measured by the proportion of the employed residents in the *resident population* aged 15 and above, with the data from the Population Censuses and 1 per cent Population Sample Surveys. To measure **the gender gap in the labour market**, the difference between the proportions of the employed for the males and the females is taken.

The overall **education** level in a province is measured by the proportion of residents with tertiary education (i.e., college and above) in the *resident population* aged 6 and above, according to the data from the Population Censuses and 1 per cent Population Sample Surveys. Similarly, to measure **the gender gap in educational attainment**, the difference between the proportions of tertiary education for males and females is taken.

As stated above, **sex ratio at birth**, an indicator of the gender difference at birth, is used to measure the gender composition of children in the province. It refers to the number of male births per 100 female births. The data were from Population Censuses and 1 per cent Population Sample Surveys. To some extent, the indicator also reflects the selective abortion and son preference in an area.

Furthermore, Zhang et al. (2014) have argued that the presence of dependents (both children and the elderly) are likely to be a protective factor of marriage: the more the dependents in a family, the less inclined the couple to divorce. Therefore, the provincial total dependency ratio is controlled for (i.e., the ratio of population aged 0–14 or aged 65 and above to the population aged 15–64). Moreover, as Chongqing was separated from the Sichuan province in 1997, the data of Chongqing in 1990 and 1995 were from the data of the Sichuan province.

All the dependent and independent variables are calculated for the years 1990, 1995, 2000, 2005, 2010, and 2015. Table 1 provides descriptive statistics of the variables. During the period of 1990–2015, the provincial divorce rates ranged from 1.43 (per 1000) to 17.24 (per 1,000), with an average of 5.35 (per 1000). It is noteworthy that migration has a minimum value of -19.69, meaning that the province experienced out-migration, with the *resident population* smaller than *the hukou population* by 19.69 per cent.

Analytical strategies

In this study, there are 186 observations for 31 provinces at six time points. Traditional fixed effects regression and fixed effects spatial autoregression ('SAR') are employed to capture the effects of the factors on the provincial refined divorce rates. Scholars have argued that divorce can be 'contagious' and spread from one place to another, resulting in some spatial dependence (Aberg, 2009). As people move across the provinces,

Variables	Mean	Standard deviation	Minimum	Maximum
Refined divorce rate (per 1000)	5.35	3.31	1.43	17.24
Total dependence ratio	42.62	9.72	20.94	67.44
Log (GDP per capita)	7.65	0.92	5.84	9.54
Urbanisation (%)	42.42	18.08	12.58	89.27
Migration (%)	2.92	12.06	-19.69	67.36
Employment (%)	70.20	7.64	54.30	83.32
Gender gap in employment (%)	14.05	5.62	3.44	28.47
Tertiary education (%)	6.74	6.17	0.43	42.34
Gender gap in education (%)	1.34	1.03	-2.15	5.86
Sex ratio at birth (per 100)	115.51	8.08	97.43	138.01

Table 1. Descriptive statistics of variables.

particularly between neighbouring provinces, they will exchange culture, ideas and attitudes on divorce through social interactions which leads to the spread of divorce behaviour. The divorce pattern in the neighbouring provinces will finally become similar to the province of origin. Therefore, spatial diffusion of divorce emerges. To reveal the role of the factors more accurately, the impact from spatial diffusion of divorce should be controlled. Hence, the SAR model is chosen to solidify the findings from the traditional fixed effects model since it takes into account the spatial correlation of divorce. The traditional fixed effects panel regression controls for the time-invariant individual effect of each province as well as the year effect. The formula for the model is as follows:

divorce rate_{it} =
$$\beta_0 + \beta_1 X_{1,it} + \ldots + \beta_k X_{k,it} + \alpha_i + \varepsilon_{it}$$
,

 $X_{k,it}$ refers to independent variables; β_k refers to the coefficients of the independent variables; α_i refers to the provincial fixed effects.

In the fixed effects SAR, it is assumed that the divorce rate of a province is more likely to be influenced by the nearby provinces than by the provinces faraway. Therefore, a spatial weight which reflects the geographic closeness of every other province to a certain province is introduced. The formula for the fixed effects SAR model is as follows:

divorce rate_{it} =
$$\beta_0 + \rho \sum_{j=1}^n W_{ij}$$
*divorce rate_j + $\beta_1 X_{1, it} \dots + \beta_k X_{k,it} + \alpha_i + \varepsilon_{it}$

 W_{ij} refers to the spatial weight, which is constructed based on the criterion of the Queen contiguity.¹ divorce rate_j is the divorce rate in other provinces. ρ tests the assumption that a province's divorce rate is related to the neighbouring province's divorce rate. It measures the strength of this relationship and is often known as the spatial autocorrelation coefficient.

Moreover, to examine the factors across time and space, the interactions with years and 'large regions' in China are estimated. The 'large regions'² refers to 'the East region', 'the Central region', and 'the West region'. The three regions not only reflect different levels of economic development but also different degrees of openness and internationalisation. Among the three regions, the East is more developed while the West is less. Compared to the Central and West regions, the East region is most internationalised and open to new technology, information, culture and ideas (Su, 2011). A map to display the three 'large regions' can be found in Appendix Figure A1.

10 👄 M. CHEN ET AL.

In addition, it should be noted that there are five autonomous provinces—Guangxi, Ningxia, Inner Mongolia, Xinjiang, and Tibet, which have high proportions of minority ethnic groups as well as different legal arrangements and cultures of marriage and divorce. Besides, Wang and Zhou have also pointed out that the divorce profile of Chongqing is unique and little understood. Therefore, we give additional attention to these six provinces. As we are aware that some independent variables might be correlated thus resulting in multicollinearity, we have checked the correlation coefficients (see Appendix Table A1) and variance inflation factor (VIF) (see Appendix Table A2). A common rule is that when the VIF is greater than 10, there is strong multicollinearity among the variables (Marquandt, 1980). As the VIFs of all independent variables are below 10, multicollinearity will not significantly affect the present results. More details on this can be found in Appendix.

Results

Provincial divorce trends

Figure 1 shows the evolution of the provincial refined divorce rates over the period of 1990–2015. As shown in the 1990s, except for Xinjiang, the divorce maps looked more homogeneous and the provincial divorce rates were all very low, about 2.96 per 1000 on average. The high divorce rate, about 17.24 per 1000, in Xinjiang was partly due to its ethnic composition, cultural tradition and religion (Zeng & Wu, 2000). In Xinjiang, the Uygur ethnic group makes up a large proportion of the local population. The Islamic religion and culture of this ethnic group are more tolerant toward divorce (Xu & Mao, 2001).

In the 2000s, the spatial differences have become noticeable. The provinces in the northeast (such as in Heilongjiang, Jilin, and Liaoning) and the central-west parts (e.g., in Qinghai, Sichuan, and Chongqing) of China had higher divorce rates. In contrast, except for Beijing and Shanghai—the most developed cities in China, the divorce rates were still very low in the east coastal areas.



Figure 1. The refined divorce rates of 31 provinces in China over the period of 1990–2015.

In the 2010s, the patterns have become very heterogeneous. In 2015, Tibet had the lowest refined divorce rate of 3.2 (per 1000 married persons), while Xinjiang and Heilongjiang had rates of 15.5, almost five times higher than Tibet. Currently, the northeast and northwest parts of China have the highest divorce rates, followed by the provinces in the west area (e.g., in Sichuan, Chongqing, and Guizhou); the south-eastern areas had relatively lower rates. Figure 2 shows the change ratio of the refined divorce rates between 1990 and 2015. In terms of speed, the divorce rates increased at a slower pace in the northeast and northwest areas while at very fast pace in the east coastal areas (such as in Shandong, Jiangsu, Zhejiang, and Fujian). Provinces with massive out-migration such as Chongqing, Anhui, and Henan have also seen dramatic rise in divorce rates. Over the past 25 years, the spatial variation in divorce has increased greatly, highlighting the significance of looking into the subnational divorce patterns.

Factors affecting provincial divorce rates

Firstly, factors influencing the provincial divorce trends were investigated. Table 2 shows the results from the traditional fixed effects models (Models 1 and 2) and the SAR models (Models 3 and 4). As shown in the SAR models, the spatial autocorrelation coefficients are about 0.33–0.35, indicating a significant and positive spatial dependence of the divorce rates across the provinces, or the so-called positive spillover effect. This means that the rise of the divorce rates in the neighbouring provinces would increase the divorce rates in the reference provinces, confirming the existence of spatial diffusion in China.

After controlling for the spatial diffusion of divorce, despite slight difference in the values, the coefficients of the factors in Model 3 are still very consistent with Model 1. This indicates that the socioeconomic factors identified in the traditional fixed effects analyses do predict the provincial divorce rates. The provincial divorce rate is shown to be positively related to the total dependency ratio, economic development, and



Figure 2. The change ratios of the refined divorce rates over the period of 1990–2015. Note: change ratio is calculated by the rate in 2015 divided by the rate in 1990.

12 🛞 M. CHEN ET AL.

Table 2. Results of the traditional fixed effects models and the SAR models

Variables	Model 1 (FE)	Model 2 (FE)	Model 3 (SAR)	Model 4(SAR)
Total dependency ratio	0.115***	0.114***	0.097***	0.100***
	(0.023)	(0.023)	(0.020)	(0.019)
Log (GDP per Capita)	1.803	1.834"""	1.513"""	1.029
Urbanication	(0.084)	(0.051)	(0.500)	(0.538)
UIDdilisation	(0.045	0.055	(0.045	(0.055"
Migration	(0.022)	(0.022)	(0.018)	(0.018)
Migration	(0.009		(0.015)	
Migration area	(0.018)		(0.013)	
Ref mild-migration areas				
Out-migration areas		0.414		0 307
out migration areas		(0.336)		(0.278)
In-migration areas		0.751**		0.65**
in migration areas		(0.354)		(0.292)
Tertiary education	0.046	0.050	0.027	0.014
	(0.064)	(0.049)	(0.053)	(0.041)
Employment	-0.120***	-0.096**	-0.090***	-0.076**
2	(0.039)	(0.038)	(0.033)	(0.031)
Gender gap in tertiary education	0.001	-0.020	-0.043	-0.032
	(0.147)	(0.129)	(0.121)	(0.106)
Gender gap in employment	-0.105***	-0.093**	-0.078**	-0.070**
51 1 7	(0.040)	(0.040)	(0.033)	(0.033)
Sex ratio at birth	-0.026*	-0.028**	-0.030**	-0.032***
	(0.014)	(0.014)	(0.012)	(0.012)
Time effect				
Ref. Year 1990				
Year 1995	-0.648*	-0.648*	-0.547*	-0.590*
	(0.389)	(0.373)	(0.320)	(0.307)
Year 2000	-1.112*	-1.033*	-0.900*	-0.883*
	(0.635)	(0.614)	(0.523)	(0.506)
Year 2005	-1.551*	-1.409	-1.408*	-1.333*
	(0.927)	(0.905)	(0.762)	(0.744)
Year 2010	-0.235	-0.128	-0.705	-0.556
	(1.273)	(1.262)	(1.051)	(1.043)
Year 2015	0.369	0.623	-0.667	-0.342
	(1.508)	(1.494)	(1.261)	(1.250)
ρ			0.349***	0.331***
			(0.081)	(0.081)
Observations	186	186	186	186
R-squared	0.884	0.888	0.455	0.434
Number of IDs	31	31	31	31

Note: Dependent variables are the provincial refined divorce rates in all models. Standard errors are in brackets. ***p<0.01, **p<0.05, *p<0.1.

urbanisation. Unexpectedly, the total dependency ratio had a significant positive association with the divorce rate: the higher the total dependency ratio, the higher the provincial divorce rate. This may be because high total dependency ratio means more burden on the working-age population at the macro level and higher pressure on the couples to meet their financial and care needs at the micro level, which in turn may cause more tension on marital relationships. The overall employment rate and the gender gap in employment had negative associations with the divorce rates. For instance, the results in Model 3 show that 1 per cent increase of the employment rate is associated with a decrease of 0.09 (per 1,000 married women) in the provincial divorce rate, and 1 per cent increase of the gender gap in employment is associated with a decrease of 0.078 in the provincial divorce rate. On the one hand, it means that high employment rates or good macroeconomic conditions would stabilise marriage; on the other hand, large gender gaps in the labour market would also suppress the divorce rate, implying that the male breadwinner model would still do good to Chinese marriages today. Besides, sex ratio at birth contributes negatively to the divorce rate: the higher the sex ratio at birth, the lower the provincial divorce rate. For example, according to Model 3, if the sex ratio increases by one unit (e.g., from 100 to 101), the provincial divorce rate will decrease by 0.03 (per 1,000 married women).

Education and gender gap in education as well as migration seem to have no significant impact on the provincial divorce rates. In order to examine whether divorce rates differ significantly between areas with inward migration and areas with outward migration, the continuous variable 'migration' has been replaced by a categorical variable 'migration area' in Models 2 and 4. It is discovered that the in-migration areas have significantly higher divorce rates than the mild- and out- migration areas.

Factors' interactions with time

To investigate how the roles of these factors have changed over time, the interactive effects between the factors and the years have been estimated based on the SAR models. Table 3 shows the coefficients of the interaction terms. Marginal effects of the factors are visualised in Figure 3. Results of the full models can be obtained from the authors. The interactions with the GDP per capita, urbanisation, migration, and employment are significant. In contrast, interactions with education, gender gaps in employment and education, and sex ratio at birth are insignificant (these results are not presented in Table 3).

As shown in Figure 3, the impact of the GDP per capita has been increasing, especially since 2005. Similarly, the positive impact of urbanisation has been rising over the years. For instance, if urbanisation increased by 1 per cent, the divorce rate would increase 0.018 (per 1000) in 1990; in 2015, 1 per cent increase of urbanisation was associated with 0.152 (per 1000) increase of the divorce rate. The two findings indicate that over

	Log(GDP per capita)	Urbanisation	Migration	Employment
Main effect	0.712	0.018	0.375**	0.003
	(0.774)	(0.019)	(0.174)	(0.067)
Interactions with time				
Ref. year 1990				
Year 1995	-0.098	0.012	-0.277*	-0.002
	(0.433)	(0.012)	(0.154)	(0.043)
Year 2000	0.325	0.032**	-0.302*	-0.031
	(0.511)	(0.014)	(0.162)	(0.047)
Year 2005	0.935*	0.063***	-0.350**	-0.072
	(0.538)	(0.016)	(0.168)	(0.049)
Year 2010	1.025	0.080***	-0.387**	-0.055
	(0.704)	(0.021)	(0.172)	(0.058)
Year 2015	1.999**	0.134***	-0.368**	-0.155***
	(0.809)	(0.025)	(0.173)	(0.06)

Table 3. Interactions of the social and economic factors with time based on the SAR models.

Notes: standard errors are in brackets. ***p<0.01, **p<0.05, *p<0.1. This table combines the results of the interaction coefficients from eight SAR models. Each model tests the interaction effect with one factor. For every model, the dependent variable is the provincial refined divorce rate, and the control variables are the total dependency ratio, Log (GDP per capita), urbanisation, migration, tertiary education, employment, gender gap in education, gender gap in employment, and the sex ratio at birth. As the interactions of tertiary education, gender gap in education, gender gap in employment and the sex ratio at birth are statistically insignificant, the results are not presented.

14 👄 M. CHEN ET AL.



Figure 3. Marginal effects of GDP per capita, urbanisation, migration, and employment: based on Table 3.

time, the roles of economic development and urbanisation have become more important relating to the provincial divorce trends.

It is also interesting to note that migration had a positive relationship with the divorce rate in 1990, while this positive association had almost disappeared in the 2010s. Specifically, in 1990, the divorce rate was lower in the provinces with more out-migration while higher in those with more in-migration; over the years, this effect of migration has declined. Moreover, the negative association between employment and divorce rates has become stronger over the study period (although only significant in 2015).

Factors' interactions with regions and the five autonomous provinces

To examine whether the factors play different roles across regions, the interactive effects between the factors and the 'large regions' are estimated. The results of the interaction terms are presented in Table 4. The marginal effects of the factors are visualised in Figure 4. Different from the results in Table 3, the interactions of the GDP per capita, urbanisation, migration, education and employment are insignificant (these results are not presented in Table 4); but the interactions of gender gap in education, gender gap in employment, and sex ratio at birth are significant. Educational gender gap is positively associated with provincial divorce rates in the West region (reflected in the main effect), but negatively associated with divorce rates in the Central and East areas. This means that the increase of female educational attainment and the consequent narrowing gender gap in education would likely lead to the decline in the divorce rate in the West region. This apparently is counterintuitive. The reason could be that compared to the Central and East regions, the less-developed West region is more traditional and could have more arranged marriages there. The improvement of female education would help to reduce arranged marriages and avoid unsatisfactory marriages in the beginning, thus reducing

	Gender gap in tertiary education	Gender gap in employment	Sex ratio at birth
Main effect	0.607**	-0.035	-0.073***
	(0.246)	(0.050)	(0.018)
Interactions with large regions			
Ref. West region			
East region	-0.670**	-0.009	0.079***
-	(0.274)	(0.058)	(0.027)
Middle region	-0.892***	-0.114**	0.057**
-	(0.289)	(0.058)	(0.024)

Table 4. Interactions of the social and economic factors with migration areas based on the SAR models.

Notes: standard errors are in brackets. ***p<0.01, **p<0.05, *p<0.1. This table combines the results of the interaction coefficients from eight SAR models. Each model tests the interaction effect with one factor. For every model, the dependent variable is the provincial refined divorce rate and the control variables are the total dependency ratio, Log (GDP per capita), urbanisation, migration, tertiary education, employment, gender gap in education, gender gap in employment, and the sex ratio at birth. As the interactions of Log(GDP per capita), urbanisation, tertiary education, and employment are statistically insignificant, the results are not presented.

divorce in the end. Gender gap in employment is found to have the strongest negative association with the provincial divorce rates in the Central area. In fact, in terms of gender gap in employment over the period of 1990–2015, the central area is most gendered (a gap of 17 per cent), compared to the West (a gap of 11 per cent) and the East (a gap of 15 per cent) areas.

Figure 4 also reveals that the negative impact of sex ratio at birth is weaker in the East and Central regions. Given that the sex ratio at birth increases by one unit, the divorce rate will decrease by 0.073 (per 1000) in the West region and by 0.016 (per 1,000) in the Central region, while the divorce rate will increase by 0.006 (per 1,000) in the East region.

In addition, special attention has been paid to the five autonomous provinces that have high proportions of minor ethnic groups, as well as Chongqing. Table 5 presents the coefficients for the interaction between the province dummies and the factors based on the SAR models. In the autonomous provinces such as Guangxi, Ningxia, and Inner Mongolia, almost all interaction coefficients are insignificant, indicating that factors play similar roles in these places compared to the rest of China. In Xinjiang and Tibet, many interaction coefficients are statistically significant. In Xinjiang and Tibet, GDP per capita, urbanisation, migration, education, and sex ratio at birth are negatively associated with the divorce rate, while employment and gender gap in education are positively associated with the divorce rate. In Chongqing, compared to the rest of China, GDP per capita, urbanisation, education, and gender gap in employment have



Figure 4. Marginal effects of gender gap in education, employment, and sex ratio at birth: based on Table 4.

					2	- -		
	Log(GDP per capita)	Urbanisation	Migration	Education	Employment	Gender gap in education	Gender gap in employment	Sex ratio at birth
SAR model								
Main effect	1.328**	0.009	0.013	0.028	-0.075**	-0.129	-0.058*	-0.017
	(0.578)	(0.017)	(0.015)	(0.050)	(0.031)	(0.129)	(0.031)	(0.013)
Interactions with regions								
Guangxi	-0.145	-0.004	-0.003	-0.037	0.023	0.453	-0.081	0.012
•	(0.371)	(0.027)	(0.050)	(0.104)	(0.053)	(0.398)	(0.116)	(0.080)
Ningxia	0.229	0.016	-0.169	0.042	-0.037	1.438	0.076	0.049
1	(0.359)	(0.029)	(0.328)	(0.065)	(0.049)	(1.541)	(0.091)	(0.092)
Inner Mongolia	0.067	0.017	0.567*	0.052	-0.065	-0.303	0.095	-0.046
	(0.315)	(0.036)	(0.309)	(0.063)	(0.056)	(0.358)	(0.201)	(0.098)
Xinjiang	-1.856***	-0.130**	-0.730*	-0.243***	0.294***	1.240***	-1.002***	-0.190*
1	(0.475)	(0.058)	(0.405)	(0.076)	(0.085)	(0.450)	(0.188)	(0.107)
Tibet	-1.721***	-0.287***	-0.579*	-0.365***	0.161**	1.282*	0.146	-0.095**
	(0.441)	(0.074)	(0.310)	(0.126)	(0.076)	(0.736)	(0.098)	(0.037)
Chongqing	1.920***	0.120***	-0.251^{***}	0.393***	-0.188***	0.779	0.608***	0.250
	(0.338)	(0.022)	(0.057)	(0.076)	(0.036)	(0.753)	(0.114)	(0.165)
Notes: Standard errors are	in brackets. *** <i>p</i> <0.01, *	*p<0.05, *p<0.1.	This table con	hines the resu	ults of the intera	ction coefficients from eight S	AR models. Each model tests th	e interaction effect
with one factor. For eve	ry model, the dependen	t variable is the p	orovincial refin	ied divorce rai	te and the contr	ol variables are the total dep	endency ratio, Log (GDP per cal	oita), urbanisation,
migration, tertiary educe	ation, employment, gene	der gap in educat	tion, gender <u>c</u>	Jap in employ	ment, and the s	ex ratio at birth.		

Table 5. Interactions of the social and economic factors with the autonomous regions and Chonqing.

stronger positive associations with divorce rates, while employment and migration have stronger negative associations with divorce rates.

Discussion and conclusion

This study has examined the divorce trends and patterns in China from a tempo-spatial approach. It updates previous descriptive studies on the evolution of divorce in the provinces of China (Wang & Zhou, 2010; Zeng & Wu, 2000). The divorce maps over the period of 1990–2015 have demonstrated that there is great variation in the levels and trends of divorce across the provinces. This result highlights the diversity in the regional pattern of divorce, which will not be seen in the national divorce trend. It is also observed that there is a positive spatial correlation of divorce at the provincial level, implying that to some extent, divorce in China is spatially contagious, that is, the increase of divorce can diffuse into neighbouring provinces.

The study contributes to the existing literature by filling three gaps. First, under the framework of the ecological system and with guidance from theories of SDT, social integration, and gender revolution, it provides a comprehensive examination of the economic and social drivers on the subnational divorce trends in China. Not only does this study look into factors such as economic development, urbanisation, migration and education, it also takes into account gender gaps in employment and education as well as the gender composition of children, which have not been investigated at the macro level in the Chinese context. This adds to the originality of the study. Second, the study explores how the roles of these factors have changed over time in affecting the provincial divorce rates. To some extent, the results help to understand why the existing research has inconsistent findings on some factors such as economic development, urbanisation, and employment, in particular when the research focused on different time periods (Wang & Zhou, 2010; Zeng & Wu, 2000; Zhang et al., 2014). Third, this study reveals how the impacts of the factors differ across the regions—the East, Central and West regions, as well as the five autonomous provinces.

Investigation into the past divorce trajectory and related factors also helps to predict the future prospects of divorce in China. Specifically, it is found that economic development and urbanisation are important factors. The positive role of economic development is consistent with findings by Wang and Zhou (2010). Beyond that, we further discovered that their impacts are escalating over time (supporting the Hypotheses 1, 2 and 7: the positive roles of economic development and urbanisation in divorce are increasing over time). With the gradual relaxation of divorce laws in China, rapid economic growth and urbanisation at the macro level have come into play in individuals' family lives. This is reflected in the present results: divorce laws in China were amended in 2001 by allowing unilateral divorces and the procedures of civil divorce were simplified in 2003; since 2005, the impacts of the GDP per capita and urbanisation on the divorce rates have risen greatly (see Table 3). In the context where the state is retreating from the family domain, advancement in development will lead to increasing diversity in the life course. It can thus be anticipated that with further development, the divorce rate may continue to rise. These rapid changes have negative impacts on the stability of the martial relationship among the Chinese population and constitutes an area of priority and concern in ensuring sustainable and healthy development for the whole country.

It is also found that increase in the overall employment rate stabilises marriage, while shrinkage of the gender gap in employment increases divorce (supporting Hypothesis 4: employment and gender gap in employment are negatively associated with divorce rates). The negative association between the gender gap in employment and the divorce rate, particularly in the Central region, indicates that the traditional male breadwinner model is associated with marital stability. As shown in Appendix Figure A2, in the study period, the gender gap in most provinces was not shrinking, and in some cases was even increasing (that is, women's employment decreased more than men's). In addition, the role of employment has become more protective to marriage over time. This implies that nowadays, economic security is an especially important factor for marital stability in the Chinese society. Therefore, maintaining stable macroeconomic environment and reducing unemployment rates are very likely to have a suppressing effect on divorce rates. However, it is observed that between 1990-2015, the employment rates for both men and women had been declining in almost all the provinces (see Appendix Figure A2). Thus, the worsening employment situation partially contributed to the continuous rise of the divorce rate in China. It seems that the positive impact of the widening gender gap in employment on the divorce rate has been offset by the negative impact of the declining employment rate, thus resulting in the surge of divorce rates.

In Hypothesis 3, it is assumed that provinces with high in-migration or out-migration rates have higher divorce rates. The analyses showed that only in-migration was positively related to divorce. Another interesting finding is the changing role of migration in the past 25 years -particularly the diminishing effect of migration on divorce rate in more recent years. In the 1990s, provinces with more in-migration often had higher divorce rates; but in the 2010s, this relationship has disappeared or even turned the other way. That is, currently, provinces with in-migration may have lower divorce rates while provinces with outmigration may have higher divorce rates. There might be two reasons for this reversal. Firstly, in earlier times, in-migration provinces were more developed and modernised with a social atmosphere more open to divorce, while out-migration provinces were less developed and more traditional with stronger norms against divorce. As internal migration becomes more extensive in China, the effect of family separation caused by out-migration may have partially offset the protective effect of the traditional atmosphere in outmigration areas. Meanwhile, population outflow would also bring in more modern values and ideology, thus gradually eroding traditional norms in those areas. Secondly, there could also be a compositional effect on the divorce rate from migration. In a province, divorces include those registered at the local Civil Affairs Bureau and those approved by the courts, with the former making up the majority. Although migrants are eligible to apply for a court divorce in the host province,³ a registered divorce is only open to the *hukou* population.⁴ If migrant couples want a registered divorce from the Civil Affairs Bureau, they have to return to the province where they have registered their hukou. Therefore, for provinces with a large number of immigrants, in-migration would decelerate the rise of the divorce rate as the denominator is enlarged; and for the same reason, in provinces with a large scale of population outflow, the divorce rate would escalate even faster.

In addition, the effect of education on divorce deserves special attention. In this study, it is found that the average education level is not a significant predictor, this is in contrast with the hypothesis and the findings by Wang and Zhou (2010) indicating that education is a stronger predictor of provincial divorce rates. This may be because in the present

research, focus is on a longer period of study, 1990–2015, while Wang and Zhou focused on the shorter period of 1996–2007. Furthermore, spatial panel data analysis—fixed effect SAR modelling has been adopted to control the province-specific time-invariant effect and the spillover effect of divorce, while OLS regressions were conducted in Wang and Zhou. In addition, more covariates such as urbanisation, migration, employment, gender gap in education and employment, and sex ratio at birth were included in this research, while Wang and Zhou only considered GDP per capita and education.

Interestingly, the present results show that education does play a role but more likely through the improvement of female education attainment, particularly when the regional dimension is considered. Specifically, the gender gap in education is positively associated with provincial divorce rates in the West region but negatively associated in the East and Central regions (supporting Hypothesis 8: the associations between educational gender gap and divorce rates vary across the three regions). It means that shrinkage of the educational gender gap would reduce the divorce rates in the West region. In other words, the rise of female education attainment will not always encourage divorce. Several scholars have argued that in the early stage of industrialisation and modernisation, divorce can decline if the impact of divorce-reducing factors overwhelms the impact from the divorce-raising factors (Goode, 1993; Jones, 1997; Kawashima & Steiner, 1960). At this stage, the increase of female education can be a divorce-reducing factor, as it has raised the social status of women and increase age at marriage, which would reduce arranged marriages and marriages in teens. Consequently, breakups from these fragile unions would be reduced in the first place. As the West region is relatively less developed, such divorce-reducing impact from the rising female education may hence be more prominent. Following this logic, the results that GDP per capita, urbanisation, and education play reversed roles in Xinjiang and Tibet can be explained through a similar mechanism that development and modernisation brought the decline to arranged marriages while increased love marriages and later marriages. But as this region experiences further economic and social development in the future, it can be expected that improvement of female education will turn into a divorce-raising factor due to further increasing female autonomy (Jones, 1997), which has already been seen in the East and Central regions.

The present findings on sex ratio at birth accord with Hypothesis 2 (that provinces with a higher sex ratio at birth have lower divorce rates) and with previous literature (Morgan et al., 1988). Moreover, consistent with previous literature (Ma et al., 2019; Xu et al., 2015; Zeng et al., 2004) and with Hypothesis 8 (that the associations between socioeconomic factors and provincial divorce rate vary across regions), it is shown in this research that the association of sex ratio at birth with provincial divorce rate depends on regions. In particular, sex ratio at birth has a weak and positive relationship with the provincial divorce rate in the East region. This may seem counterintuitive. Historically, sex ratio at birth was lower in the West region and higher in the East region. This was so to some extent because there was strong son preference in the East region and the one-child policy imposed upon the Han Chinese. In contrast, son preference has been relatively weaker in the West region and the one-child policy did not apply to many ethnic minority groups living in that region. However, according to statistics, the experience of the East regions is spilling over to the West and Central regions. In the past decade, the skewed sex ratio at birth has spread to the West region (in provinces such as Ningxia, Yunnan, Gansu, Guizhou), while the East region has seen some decline (in provinces such as Jiangsu, Guangdong) (UNFPA,

20 🛞 M. CHEN ET AL.

2018). To some extent, this changing pattern may explain the present findings in the East regions where the usual negative relationship between sex ratio at birth and divorce rate has reversed into a weak and positive relation. Also, in the East region, modernisation and westernisation have promoted more egalitarian gender values, thus reducing preferences for sons, and lowering the sex ratio.

This study has some limitations. First, as the analyses are based on the refined divorce rates, the age-specific pattern of divorce across time and region has not been investigated. This is due to the limited access to the divorce data broken down by age. If more detailed data are made available in the future, this gap can well be filled. Second, the impact of 'fake divorce', which was mainly triggered by the house-purchase restriction policy, has not been considered. With the aim of controlling house prices, the housing policy was put forward in 2010 first in Beijing, and then adopted in other cities, unintentionally resulting in many couples filing for divorces to buy their second property.⁵ Fan (2016) has shown that this policy mainly increased divorce rates in the city centre without much impact on the suburb areas. Third, this study mainly focuses on the economic and social factors of divorce in China but has not included attitudes and values with accurate measurements. If there is a large-scale nationally representative survey in China with questions covering the attitudes and values toward divorce, future studies can then link ideational changes with the provincial divorce trends. Fourth, this study is a macro level analysis of divorce, which cannot fully reveal the mechanism between individual divorce behaviour and macro socioeconomic factors. As the divorce decisions are made at the micro level, the identified macro factors of the divorce rate may suffer some risks of ecological fallacy. To fill this gap would call for a multilevel study to explore how macro factors transfer their impact into the community and individual levels. In addition, a combination of quantitative and qualitative approaches is also needed to understand the individuals' divorce decision-making process and causal mechanisms.

Despite all these limitations, this study highlighted the changing macro socioeconomic factors that contributed to the spatial variations of the divorce rates in China. The China experience might be relevant to other developing countries undergoing dramatic social changes. Countries that have undergone rapid industrialisation and modernisation may also see the increasing impact of factors such as economic development, urbanisation, and employment on divorce over time. In countries with large geographic areas and diverse ethnic composition, there may also be great spatial variations of divorce, and as what has been shown in China, the roles of some social and cultural factors (for example, gender inequality) are likely to differ across regions within the country. Thus, a tempo-spatial analysis of divorce is essential.

Notes

- 1. The Queen contiguity is a criterion to define neighbouring spatial units. According to this criterion, any spatial unit sharing a common edge or a common vertex will be identified as a neighbour.
- 2. The three regions were classified by the Chinese government based on geographic location and the economic development level.
- 3. Migrant couples can apply for divorces through the local courts if either the husband or the wife or both have lived in the local place for at least 1 year.

- 4. Married couples can register for divorces at the local Civil Affairs Bureau if either the husband or the wife has the local *hukou*. If both of them do not have the local *hukou*, then they are not eligible to register for divorce at the local Civil Affairs Bureau.
- 5. The house-purchase restriction policy favours first-time buyers requiring them only to place a smaller amount of deposit and pay a lower interest rate. Married couples with one house already can divorce each other to buy their second house as their first individual property and can still enjoy the same benefit.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by the Fonds de la Recherche Scientifique (FNRS) under the Grant (FNRS 1.B076.19 for Mengni Chen), the Université Catholique de Louvain Grant ARC 'Family transformations: incentives and norms' (for Ester Rizzi) and the RGC General Research Fund (106160261 for Paul Yip).

ORCID

Mengni Chen D http://orcid.org/0000-0001-7018-8713

References

- Aberg, Y. (2009). The contagiousness of divorce. In *The Oxford handbook of analytical sociology* (pp. 342–364). Oxford University Press.
- Álvarez, I. C., Barbero, J., & Zofío, J. L. (2017). A panel data toolbox for Matlab. *Journal of Statistical Software*, *76*(6), 1–27. https://doi.org/10.18637/jss.v076.i06
- Booth, A., Edwards, J. N., & Johnson, D. R. (1991). Social integration and divorce. *Social Forces*, 70(1), 207–224. https://doi.org/10.2307/2580069
- Bronfenbrenner, U. (1992). Ecological systems theory. In Six theories of child development: Revised formulations and current issues (pp. 187–249). Jessica Kingsley Publishers.
- Bronfenbrenner, U. (1995). Developmental ecology through space and time: A future perspective. In *Examining lives in context: Perspectives on the ecology of human development* (pp. 619–647). American Psychological Association. https://doi.org/10.1037/10176-018
- Cannon, K. L., & Gingles, R. (1956). Social factors related to divorce rates for urban Counties in Nebraska. *Rural Sociology*, 21(1), 34.
- Chan, K. W. (2013). China: Internal migration. In I. Ness & P. Bellwood (Eds.), *The encyclopedia of global human migration*. John Wiley & Sons, Inc. https://doi.org/10.1002/9781444351071. wbeghm124
- Chen, M., & Yip, P. S. F. (2018). Decomposing the crude divorce rate in five countries: Singapore, Taiwan, South Korea, the UK, and Australia. Asian Population Studies, 14(2), 137–152. https:// doi.org/10.1080/17441730.2018.1452380
- Cherlin, A. J. (2012). Goode's world revolution and family patterns: A reconsideration at fifty years. *Population and Development Review*, *38*(4), 577–607. https://doi.org/10.1111/j.1728-4457.2012. 00528.x
- Davis, D. S. (2014). Privatization of marriage in post-socialist China. *Modern China*, 40(6), 551–577. https://doi.org/10.1177/0097700414536528
- Dommaraju, P., & Jones, G. (2011). Divorce trends in Asia. Asian Journal of Social Science, 39(6), 725–750. https://doi.org/10.1163/156853111X619201

22 🕢 M. CHEN ET AL.

- The Economist. (2016). *Divorce: A love story*. https://www.economist.com/china/2016/01/23/divorcea-love-story
- Fan, Z. (2016). Buying houses for divorce- a study on the housing restriction policy. *World Economic Papers*, *4*, 1–17.
- Finnäs, F. (1997). Social integration, heterogeneity, and divorce: The case of the Swedish-speaking population in Finland. *Acta Sociologica*, 40(3), 263–277. https://doi.org/10.1177/ 000169939704000303
- Gao, M. (2011). Rural divorce rate and migrant rural workers: A panel data research study based on Chinese 2003–2009 rural data. *Journal of World Economy (in Chinese)*, 183(10), 55–69.
- Giles, J., Albert, P., & Zhang, J. (2005). What is China's true unemployment rate? *China Economic Review*, *16*(2), 149–170. https://doi.org/10.1016/j.chieco.2004.11.002
- Glick, P. C. (1963). Marriage instability: Variations by size of place and region. *The Milbank Memorial Fund Quarterly*, 41(1), 43–55. https://doi.org/10.2307/3348679
- Goldscheider, F., Bernhardt, E., & Lappegård, T. (2015). The gender revolution: A framework for understanding changing family and demographic behavior. *Population and Development Review*, *41*(2), 207–239. https://doi.org/10.1111/j.1728-4457.2015.00045.x
- Goode, W. J. (1993). World changes in divorce patterns. Yale University Press.
- Hu, S. (2018). Parents' migration and adolescents' transition to high School in rural China: The role of parental divorce. *Journal of Family Issues*, *39*(12), 3324–3359. https://doi.org/10.1177/0192513X18778083
- Jensen, P., & Smith, N. (1990). Unemployment and marital dissolution. *Journal of Population Economics*, 3(3), 215–229. https://doi.org/10.1007/BF00163076
- Jones, G. W. (1997). Modernization and divorce: Contrasting trends in Islamic Southeast Asia and the West. *Population and Development Review*, 23(1), 95–114. https://doi.org/10.2307/2137462
- Kawashima, T., & Steiner, K. (1960). Modernization and divorce rate trends in Japan. *Economic Development and Cultural Change*, 9(1, Part 2), 213–239. https://doi.org/10.1086/449887
- Krechetova, V. (2011). Economic and cultural complexes of China. *Cybergeo: European Journal of Geography*, https://doi.org/10.4000/cybergeo.23808
- Lesthaeghe, R. (2010). The unfolding story of the second demographic transition. *Population and Development Review*, 36(2), 211–251. https://doi.org/10.1111/j.1728-4457.2010.00328.x
- Lewin, A. C. (2005). The effect of economic stability on family stability among welfare recipients. *Evaluation Review*, 29(3), 223–240. https://doi.org/10.1177/0193841X04272558
- Liao, C., & Heaton, T. B. (1992). Divorce trends and differentials in China. *Journal of Comparative Family Studies*, 23(3), 413–429. https://doi.org/10.3138/jcfs.23.3.413
- Liu, Q. (2012). Unemployment and labor force participation in urban China. *China Economic Review*, 23(1), 18–33. https://doi.org/10.1016/j.chieco.2011.07.008
- Ma, L., Rizzi, E., & Turunen, J. (2019). Childlessness, sex composition of children, and divorce risks in China. *Demographic Research*, *41*, 753–780. https://doi.org/10.4054/DemRes.2019.41.26
- Ma, L., Turunen, J., & Rizzi, E. (2018). Divorce Chinese Style. Journal of Marriage and Family, 80(5), 1287–1297. https://doi.org/10.1111/jomf.12484
- Makabe, T. (1980). Provincial variations in divorce rates: A Canadian case. *Journal of Marriage and the Family*, 42(1), 171–176. https://doi.org/10.2307/351944
- Marquandt, D. (1980). You should standardize the predictor variables in your regression models. Discussion of: A critique of some ridge regression methods. *Journal of the American Statistical Association*, *75*(369), 87–91. https://doi.org/10.1080/01621459.1980.10477430
- Ministry of Civil Affairs. (1993). Compilation of historical statistical data of civil affairs (1949-1992) (Supplement of China Civil Affairs' Statistical Yearbook). C. S. Press. https://www.yearbookchina. com/navibooklist-N2008120088-1.html
- Ministry of Civil Affairs. (2016). China Civil Affairs' Statistical Yearbook. C. S. Press. https://www. yearbookchina.com/navibooklist-N2017020208-1.html
- Ministry of Education. (2016). National base situation: Number of students of formal education by type and level. http://en.moe.gov.cn/documents/statistics/2016/national/201708/t20170823_311668. html

- Morgan, S. P., Lye, D. N., & Condran, G. A. (1988). Sons, daughters, and the risk of marital disruption. *American Journal of Sociology*, 94(1), 110–129. https://doi.org/10.1086/228953
- Palmer, M. (2007). Transforming family law in post-Deng China: Marriage, divorce and reproduction. *The China Quarterly*, 191, 675–695. https://doi.org/10.1017/S0305741007001658
- Pan, S.-M., Parish, W., Wang, A.-L., & Laumann, E. (2004). *Sexual behavior and relation in contemporary China*. Social Sciences Documentation Publishing House.
- Platte, E. (1988). Divorce trends and patterns in China: Past and present. *Pacific Affairs*, 61(3), 428–445. https://doi.org/10.2307/2760459
- Sandström, G. (2011). Socio-economic determinants of divorce in early twentieth-century Sweden. *The History of the Family*, 16(3), 292–307. https://doi.org/10.1016/j.hisfam.2011.06.003
- Schaller, J. (2013). For richer, if not for poorer? Marriage and divorce over the business cycle. *Journal* of *Population Economics*, *26*(3), 1007–1033. https://doi.org/10.1007/s00148-012-0413-0
- Shelton, B. A. (1987). Variations in divorce rates by community size: A test of the social integration explanation. *Journal of Marriage and the Family*, 49(4), 827–832. https://doi.org/10.2307/351975
- Su, C. (2011). Internationalization and Glocal linkage: A study of China's Glocalization (1978–2008). In Y. Wang (Ed.), *Transformation of Foreign Affairs and International Relations in China*, 1978-2008 (pp. 333–365). https://doi.org/10.1163/ej.9789004188143.i-487.61
- Sun, A., & Zhao, Y. (2016). Divorce, abortion, and the child sex ratio: The impact of divorce reform in China. Journal of Development Economics, 120, 53–69. https://doi.org/10.1016/j.jdeveco.2015.11. 006
- Trovato, F. (1986). The relationship between migration and the provincial divorce rate in Canada, 1971 and 1978: A reassessment. *Journal of Marriage and the Family*, *48*(1), https://doi.org/10. 2307/352245
- UNFPA. (2018). Towards a normal sex ratio at birth in China. https://china.unfpa.org/sites/default/ files/pub-pdf/ English-UNFPA%20China%20policy%20brief%20on%20GBSS%20%E 6%8E%A8% E5%8A%A8%E4%B8%AD%E5%9B%BD%E5%87%BA%E7%94%9F%E6%80%A7%E5%88%AB% E6%AF%94%E6%AD%A3%E5%B8%B8%E5%8C%96%E8%8B%B1%E6%96%87.pdf
- Wagner, M., & Weiß, B. (2006). On the variation of divorce risks in Europe: Findings from a metaanalysis of European longitudinal studies. *European Sociological Review*, 22(5), 483–500. https:// doi.org/10.1093/esr/jcl014
- Wan, Y. (2019). When the state retreats: Work units, marital regulation, and rising divorce rates in China. Marital regulation, and rising divorce Rates in China (November 16, 2019). https://doi.org/ 10.2139/ssrn.3444597
- Wang, Q. (2001). China's divorce trends in the Transition toward a market Economy1. *Journal of Divorce & Remarriage*, 35(1-2), 173–189. https://doi.org/10.1300/J087v35n01_11
- Wang, Q., & Zhou, Q. (2010). China's divorce and remarriage rates: Trends and regional disparities. *Journal of Divorce & Remarriage*, *51*(4), 257–267. https://doi.org/10.1080/10502551003597949
- Xu, A., & Mao, Y. F. (2001). The features and factors of higher divorce rate in Xinjiang Uygur ethnic region. *Chinese Journal of Population Science*, 0, 2.
- Xu, Q., Yu, J., & Qiu, Z. (2015). The impact of children on divorce risk. *The Journal of Chinese Sociology*, 2(1), 1. https://doi.org/10.1186/s40711-015-0003-0
- Yeung, W.-J. J., & Hu, S. (2016). Paradox in marriage values and behavior in contemporary China. Chinese Journal of Sociology, 2(3), 447–476. https://doi.org/10.1177/2057150X16659019
- Zeng, Y. (1995). Studies of divorce in China in the 1980s. Peking University Press.
- Zeng, Y., Schultz, T. P., Wang, D., & Gu, D. (2002). Association of divorce with socio-demographic covariates in China, 1955-1985: Event history analysis based on data collected in Shanghai, Hebei, and Shaanxi. *Demographic Research*, 7, 407–432. https://doi.org/10.4054/DemRes.2002.7.11
- Zeng, Y., & Wu, D. (2000). A regional analysis of divorce in China since 1980. *Demography*, *37*(2), 215–219. https://doi.org/10.2307/2648123
- Zhang, C., Wang, X., & Zhang, D. (2014). Urbanization, unemployment rate and China' rising divorce rate. *Chinese Journal of Population Resources and Environment*, 12(2), 157–164. https://doi.org/10. 1080/10042857.2014.910881

24 🕳 M. CHEN ET AL.

- Zhang, H. (2015). Wives' relative income and marital quality in urban China: Gender role attitudes as a moderator. *Journal of Comparative Family Studies*, *46*(2), 203–220. https://doi.org/10.3138/jcfs. 46.2.203
- Zhang, K. H., & Song, S. (2003). Rural-urban migration and urbanization in China: Evidence from time-series and cross-section analyses. *China Economic Review*, 14(4), 386–400. https://doi.org/ 10.1016/j.chieco.2003.09.018
- Zhang, Q. (2010). The institutional evolution and adjustment of Tibetan marriage and family Minzu University of China. China Minzu University Press.
- Zhang, Y. (2017). Premarital cohabitation and marital dissolution in postreform China. *Journal of Marriage and Family*, *79*(5), 1435–1449. https://doi.org/10.1111/jomf.12419
- Zhang, Z. (2017). Division of housework in transitional urban China. *Chinese Sociological Review*, 49 (3), 263–291. https://doi.org/10.1080/21620555.2017.1295809
- Zhao, X. B., & Tong, S. P. (2000). Unequal economic development in China: Spatial disparities and regional policy reconsideration, 1985-1995. *Regional Studies*, *34*(6), 549–561. https://doi.org/10. 1080/00343400050085666

Appendix

Multicollinearity

In general, multicollinearity is less of a problem to a spatial panel data than to a cross-sectional spatial data (Álvarez et al., 2017). However, the multicollinearity issue has still to be investigated. First, we have checked the correlation coefficients among the independent variables, which were shown in Table A1. The total dependency ratio ('TDR'), Log(GDP per capita), urbanisation, employment, and education were highly correlated, thus may result in multicollinearity. Therefore, the variance inflation factor ('VIF'), the most-often used indicator to diagnose the level of multicollinearity



Figure A1. The three large regions in China

has been estimated. A common rule of diagnosis is that a VIF greater than 10 indicates strong multicollinearity (Marquandt, 1980). Table A2 shows that the VIFs of all the variables are below 10. Therefore, it is thought that multicollinearity would not affect the results significantly.



Figure A2. Percentages of the employed by gender and provinces over the period of 1990–2015

Table A1. Correlat	ion coefficients of i	ndependent va	riables						
	Total dependency ratio	Log(GDP per capita)	Urbanisation	Employment	Gender gap in employment	Tertiary education	Gender gap in education	Sex ratio at birth	Migration
TDR	-								
Log(GDP per capita)	-0.8164***	-							
Urbanisation	-0.8005***	0.8439***	-						
Employment	0.7241***	-0.8288***	-0.7957***	1					
Gender gap in	-0.4553***	0.3996***	0.4892***	-0.6323***	-				
employment									
Tertiary education	-0.725***	0.8339***	0.8146***	-0.7546***	0.3436***	-			
Gender gap in education	-0.0405	0.0214	0.2457***	0.0029	-0.0734	-0.0772	1		
Sex ratio at birth	-0.0333	0.1251*	-0.0233	-0.0266	-0.1667**	-0.0512	0.1894***	-	
Migration	-0.4009***	0.3608***	0.5523***	-0.2601***	0.2287***	0.6175***	-0.017	-0.1265*	-

Table A2.	Variance inflation	factors of	the independent v	ariables
-----------	--------------------	------------	-------------------	----------

Variables	VIF
TDR	3.58
Log(GDP per capita)	8.04
Urbanisation	9.85
Employment	6.92
Gender gap in employment	2.33
Tertiary education	7.37
Gender gap in education	1.77
Sex ratio at birth	1.28
Migration	2.85
Mean VIF	4.89