

**Changing Within-couple Earnings Association and Trends in Earnings
Inequality among Married Couples in Urban China: 1988-2013**

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Introduction

The economic resemblance between husbands and wives has dramatically risen in the past few decades in many countries. Such a high prevalence of socioeconomic homogamy has long been thought of as an important driver behind the growing trends in income inequality across families (Fernández and Rogerson 2001; Schwartz and Mare 2005). If high-earners are only partnered with high-earners and low-earners only with low-earners, the original income advantage of the high-earners will be enhanced. However, the empirical evidence is largely mixed and has recently lent more support for a negative answer: even if husbands' and wives' earnings are becoming more similar, it plays a small role in accounting for the rising trends in family income inequality. Sometimes it is even found to reduce rather than exacerbate inequality (i.e. be equalizing rather than disequalizing). For example, the increased similarity between husbands' and wives' incomes is found to contribute little to the observed increase in income inequality among households in the United States, United Kingdom, Denmark, Italy, and Germany (Cancian and Reed 1998; Grotti and Scherer 2016; Hryshko, Juhn, and McCue 2017; Larrimore 2014; Pencavel 2006). Similarly small and sometimes equalizing impact on inequality trends of changes in marital sorting by other dimensions such as education and age is also documented in the United States, Europe, and urban China (Boertien and Permanyer 2017; Breen and Salazar 2011; Eika, Mogstad, and Zafar 2018; Feng and Tang 2018; Hu and Qian 2015; Western, Percheski, and Bloome 2008).

Existing literature largely ignores the complex structure of the earnings resemblance of spouses. Most studies use a single summary measure such as the Pearson's coefficient of correlation to measure the earnings resemblance of spouses (Cancian and Reed 1998; Hyslop 2001; Ku et al. 2018). As will be shown in this paper, such single summary measurement often fails to account for the complex relationship

between changes in different parts of the within-couple earnings association and their heterogeneous impacts on trends in overall family inequality. Schwartz (2010) innovatively used log-linear models to identify the separate contributions to inequality trends of the changing within-couple earnings association among dual-earner and single-earner couples, but dual- or single-earner families are still broad categories of their own. In light of the increasing diversity of dual-earner families and the heterogeneity of its implications on gender and family inequality (Raley, Mattingly, and Bianchi 2006; Schwartz and Gonalons-Pons 2016), this paper draws on the recently developed subgroup decomposition methods of inequality measures (Liao 2019) and reveals that the contribution to between-couple inequality trends of the changing within-couple earnings association is still highly unequal even within dual- and single-earner couples. In particular, most of the impact on inequality trends of the changing within-couple earnings association is contributed by changes in the within-couple earnings association among top-earning husbands and wives.

China now shares more than 20% of the world's GDP and is also ranked as one of the most unequal societies in the world (Piketty, Yang, and Zucman 2017), with its level of family income inequality surpassing that of the United States around 2010 (Xie and Zhou 2014). In particular, with the large-scale urbanization and marketization, the earnings inequality in urban China has also witnessed substantial growth in the past three decades (Zhou 2014). However, little is known about how the changing economic resemblance of spouses may have played a role in the fast-increasing household earnings inequality in urban China.

The context of urban China is theoretically relevant to the current topic. Although income inequality increased substantially in the past few decades in the English-speaking countries, some European countries and China (Atkinson, Piketty, and Saez 2011), the gender context of these similarly dramatic increases in income inequality

differs between western countries and China. In western industrial countries scholars care about the increasing economic resemblance of spouses because it naturally fits into the broader social scientific agenda about societal implications of the rising socioeconomic status of women in the past few decades (Blau and Kahn 2017; Van Bavel, Schwartz, and Esteve 2018). Improvement in women's economic status tends to be followed by increase in the economic resemblance of spouses because of assortative mating, which in turn may enlarge the income gap between families. The core theoretical intuition can be framed as a tradeoff between within-couple equality and between-couple equality: "As spouses become more economically similar, inequality among married couples may rise as marriages are increasingly likely to consist of two high- or two low-earning partners" (Schwartz 2010:1525).

In urban China, on the contrary, the similarly fast increase in household income inequality in recent decades is actually accompanied by a significant deterioration in women's labor market status after the retreat of the socialist protection for gender equity (Gustafsson and Li 2000; Wu and Zhou 2015). What would happen to the trends in the economic resemblance of spouses when women's labor market status is deteriorating over time? Under such a gender context, how would the change in the economic resemblance of spouses shape the trends in family income inequality? Answers to such questions cannot be sought in the historical experience of western industrial countries. The case of urban China offers a unique opportunity to empirically test the intuition about the tradeoff between within-couple and between-couple equality under a gender context that is opposite to the western experience.

Theoretical background

Rising earnings resemblance of spouses increases family earnings inequality in two ways. First, the earnings gap between high- and low-earning married-couple families

naturally widens if couples increasingly consist of two high- or low-earners (McCall and Percheski 2010; Schwartz 2013). This is a mechanical mechanism. Second, for the same marriage cohort, the association between spousal earnings pairing and between-couple earnings inequality may become larger over time due to its self-reinforcing nature. For example, couples in which both spouses are high-earners are more likely to outsource their housework over time (Lam 1988). In this way, both of them can have more time to focus on their market work and experience earnings premium from such concentration (Schneider and Hastings 2017). Even if there is no earnings premium, they may suffer less earnings penalty as the workplaces of high-earners are more likely to adopt family-friendly employment practices (Davis and Kalleberg 2006). Low-earning dual-career couples are less able to afford the outsourcing (Heisig 2011) and thus may not benefit from the related earnings premium or even experience earnings loss due to the tension between their household responsibilities and market work (Gonalons-Pons 2015).

However, we also have reasons to suspect that changes in the earnings resemblance of spouses may not have strong impact on the overall trends in earnings inequality among married couples. First, the self-perpetuating impact on between-couple inequality trends of the changing within-couple earnings association may be mitigated by some other factors. Although couples in which both spouses are high-earners can outsource their housework, the expenditure of the outsourcing is usually paid to low-earning couples (Schneider and Hastings 2017). This can happen in the form of directly hiring domestic workers or, more broadly, high-earning couples' rising expenditure on buying various types of household public goods from the market where most workers from middle- and low-earning families are located (Jencks 1972; Milkman, Reese, and Roth 1998). To the extent that the earnings premium generated from the reallocation of unpaid household labor by high-earning dual-career couples to paid production of household public goods by low-earning workers in dual-career or single-earner families

pales in comparison to its costs suffered by the former and the gains by the latter, increasing earnings resemblance of spouses may not exert a noticeable impact on the overall trends in earnings inequality between couples.

Second, under rising economic polarization, although high-earning dual-career couples have higher motivation to outsource more household chores, they may have lower motivation to outsource their childcare responsibilities. Rising socioeconomic polarization may exacerbate the anxiety among parents about their children's future competence, and this may be especially the case among high-SES parents (Lundberg, Pollak, and Stearns 2016; Schneider, Hastings, and LaBriola 2018). As a result, increased economic inequality may not motivate dual-career high-earning couples to devote more time to their market work, but instead push them to more heavily invest into their children's human capital accumulation, which is effort-intensive and often requires the female partner to specialize in childcare (Chiappori, Salanié, and Weiss 2017; Ramey and Ramey 2009). Children's human capital investment is not only increasingly labor-intensive but also increasingly capital-intensive. High-earning couples spend not only more absolute amount of money but also a larger share of their total family earnings on childrearing than their lower-earning counterparts do (Kornrich and Furstenberg 2013). In total, the indirect loss of family earnings due to the higher time-investment in childcare and the direct loss of family earnings due to the higher monetary investment in childrearing among dual-career high-earning couples may extenuate the mutual-reinforcement between rising family earnings inequality and rising economic resemblance of spouses, making the changing within-couple earnings association less consequential to trends in earnings inequality among married couples.

In summary, the within-couple earnings association is less of a single-dimensional entity but more of a multifaceted structure. Its changes may differ between high- and low-earning couples due to their differential demands for labor market incomes and

childcare responsibilities. These changes at different layers of the structure of within-couple earnings association may contribute to trends in earnings inequality across couples in opposite directions. As a result, the total impact on trends in between-couple earnings inequality of the changing within-couple earnings association can be weak. Nevertheless, we should not let the overall weak impact obscure the heterogeneous contributions to trends in earnings inequality across couples of changes in different layers of the earnings resemblance of spouses.

Limitation of previous empirical research

Traditionally, the relationship between spouses' earnings correlation and earnings inequality among married couples is seen as being largely deterministic: holding other factors constant, when spouses' earnings correlation increases, the earnings gap between couples will also increase (Cancian and Reed 1998; Ku et al. 2018; Lam 1997). It is also thought to be of secondary importance to trends in overall family income inequality because it is usually measured by the Pearson's coefficient of correlation whose variation is too small to impose any significant impact on trends in overall family income inequality (Mincer 1974; Pencavel 2006).

Recent studies challenge this simplistic approach by reconceptualizing the earnings resemblance of spouses as a multidimensional structure of association as opposed to a simple correlation. In the United States, Schwartz (2010) decomposes the within-couple earnings association into three components. She found the changing earnings association among dual-earner couples mainly enlarged the earnings gap between high- and middle-earning couples. The second component of the association structure — changes in wives' selective retreat from the labor force according to their husbands' earnings capacity — also increases inequality across couples but has mainly widened the gap between middle- and low-earning couples. The third component —

share of dual-earner couples — contributes less to between-couple inequality and its impact is more evenly distributed across the earnings distribution. Grotti and Scherer (2016) studied four European countries and the United States. Similar to Schwartz (2010), they distinguish the earnings association among dual-earner couples from wives' selective retreat from the labor force according to their husbands' income. They found changes in within-couple income association from mid-1980s to 2000s has had negligible impact on trends in the household income inequality in all the five countries. Their finding about the United States differs from Schwartz (2010) possibly because Grotti and Scherer (2016) relies on a cruder measure of the within-couple earnings association. A cruder measurement is usually preferred because it is easier to interpret, but it also comes at the cost of potential bias due to the crudeness. The new decomposition approach introduced in this paper overcomes this dilemma by enabling the researcher to choose how many details within the structure of within-couple earnings association they want to capture, and also to more freely decide how crudely they want the research findings based on detailed measurement to be presented to readers for expositional simplicity.

Although recent studies intend to reveal the potentially heterogeneous contribution from different parts of the complex structure of within-couple earnings association, they only end up with two or three crude components. Schwartz (2010) formally modeled the within-couple earnings association using log-linear models, but the large number of parameters of log-linear modelling usually make the results difficult to interpret (Xie and Killewald 2013). This is a shame because the intention of association models should be to make the pattern of association easier to understand rather than harder to interpret. In this article, this problem is partly solved by the new decomposition method which is directly based on the innate property of inequality measures. There will be no need to search for a log-linear model specification that best fits the observed changing pattern of association. We only need to pay attention to the specific part of the

association that has produced a considerable size of impact on trends in earnings inequality across couples. In this sense, the new method introduced here also improves upon the current method developed by Breen and Salazar (2011) to assess the contribution of rising educational assortative mating on trends in household earnings inequality. The new method can be used to directly quantify the unequal contribution to overall trends in household income inequality of changes at different parts of the association between spouses' educations.

In reality, both the dual-earner and single-earner families are still highly heterogeneous collectivities (Qian 2017; Raley et al. 2006). The rise of dual-earner couple families has far-reaching social implications in many arenas ranging from power dynamics within marriage to risk of marital dissolution, and how it produces such influences is highly heterogeneous and often calls for a careful examination of the various types within this big entity (Brennan, Barnett, and Gareis 2001; Kalmijn, Loeve, and Manting 2007; Schwartz and Gonalons-Pons 2016; Tichenor 1999). However, it remains understudied how the way in which husbands' and wives' earnings are correlated with each other among dual-earner couples may have shaped the trends in family income inequality in different manners. Intuitively, we should expect the impact of any change in within-couple earnings association that happens among top-earning couples to exert a much larger impact on the trends in overall household inequality, because trends in income inequality are usually heavily shaped by income changes among top-income holders (Atkinson, Piketty, and Saez 2011). Recent literature increasingly recognized the significant role of gender and marriage patterns in shaping the changing composition of top-income households (Piketty, Saez, and Zucman 2016; Yavorsky et al. 2019), but these studies do not quantify the impact of the changing gender and marriage patterns at top of the earnings distribution on trends in overall household inequality. This paper contributes to the literature by directly quantifying the impact of changes in earnings

resemblance of top-earning spouses on trends in overall earnings inequality among couples.

Existing research mostly measures the within-couple earnings association in relative terms, i.e. the association between husbands' earnings relative to the earnings of other husbands and wives' earnings relative to the earnings of other wives (Blackburn and Bloom 1994; Cancian and Reed 1998; Grotti and Scherer 2016; Hyslop 2001; Reed and Cancian 2012; Schwartz 2010). This helps to control for changes in the marginal distributions of husbands' and wives' earnings, but it also makes the results less intuitive. For instance, the idea of equal-earner couple as well as the increasingly popular "female-breadwinner families" are both based on the difference between spouses' absolute earnings rather than relative earnings (Raley et al. 2006). Schwartz (2010)'s models incorporate the absolute distance between earnings ranks, but she was mainly using this piece of information to more accurately capture within-couple earnings association in relative terms and the decomposition results are relatively unclear about how the changing similarity between spouses' absolute earnings have affected between-couple inequality. In this paper, I also measure the association in relative terms. Nevertheless, the new approach introduced in this paper naturally incorporates the association between spouses' absolute earnings, as will be shown later.

The Context of Urban China: Two Accounts

The context of urban China during the period under study (1988-2013) shares certain similarities with the western context yet also contains key differences. There are two accounts that are relevant here. The first account concerns the similar part between urban China and many other western countries: during this period China witnessed the great educational expansion and the increasing wage returns to schooling. Related to this

trend is the continuous growth in educational assortative mating (Gu 2018; Han 2010; Hu and Qian 2016).

However, existing evidence indicates that such an “educational” account does not add too much to our understanding of the fast increase in household income inequality. First, although the compositional expansion of the educated population is found to account for a considerable part of the rise in income inequality among individual workers (Meng 2004; Zhou 2014), its contribution to the trends in household income inequality is rather small (Feng and Tang 2018). The increasing returns to education does account for a non-negligible portion of the observed rise in household income inequality (Feng and Tang 2018), but it is unclear how it is related to trends in within-couple earnings association or changes in other family and marriage dynamics. Second, similar to what is found in many other countries, the rising educational homogamy in urban China is found to have contributed very little to the hike in urban household income inequality (Feng and Tang 2018; Hu and Qian 2015). Although education might be a strong predictor of individual earnings, the pairing of education between spouses turns out to be a poor indicator of household earnings (Hu and Qian 2015).

A second account concerns a gender-role change that is opposite to the western experience. While most western countries witnessed a significant increase in female labor force participation, especially among wives with higher-income husbands, China experienced significant deterioration in women’s labor market situation (see Wu and Zhou (2015) for a review of potential causes). The rate of labor force participation has stayed at 90% among all women aged 21-50 in urban China from the 1950s to 1990, but dropped to 63% in 2013 (Song, Sicular, and Gustafsson 2016). The mean female/male earnings ratio dropped from 86% in 1988 to 76% in 2004 (Zhang et al. 2008). Wives of poorer husbands experienced more serious deterioration in their labor market status before 2000 but have been recovering after 2000, while wives of richer husbands are

found to be increasingly less likely to work after 2000 (Wu and Zhou 2015). Recent studies found an increase in female age hypergamy since the 1990s and status-exchange marriages between better-educated older men and less-educated younger women (Mu and Xie 2014; Qian and Qian 2014). These trends are interpreted as reflecting the fast-increasing living costs and emerging consumerism in urban China, which forced men to marry down or have to wait longer to accumulate more economic resources so as to be marriageable (Mu and Xie 2014).

This “gender” account implies earnings hypogamy rather than earnings homogamy may have increased among high-earning men in urban China during the period under study. But again, it is unclear how it may have shaped the trends in couple earnings inequality. The increase in the share of couples in which the husband earns more than his wife may still contribute positively to increases in couple earnings inequality, as long as the increased earnings-hypogamous marriages are concentrated among husbands whose earnings keep growing at a faster rate than the average growth rate in the population. Male earnings hypogamy may also give those husbands an earnings premium by allowing them to specialize in their market work. Facing growing economic pressure, earnings hypogamy may very well be a strategic choice made together by both spouses who want to maximize the economic production of their household (Qian and Qian 2014). In other words, some of the increasingly “negative” association between spouses’ earnings can make positive contribution to rising household earnings inequality, depending on the type of earnings changes among couples in which such negative tendencies appear.

In summary, existing research conducted under the urban Chinese context provides no clear expectation about how the changing within-couple earnings association may have affected the trends in earnings inequality among couples. This paper contributes to the literature by offering a direct empirical test. Since the outcome of

interest is trends in earnings inequality among the married-couple population, I focus on changes in within-couple earnings association among couples in prevailing marriages. Although trends among newlyweds are better reflective of temporal changes in the pattern of assortative mating, the important roles played by changes in marital dissolution, remarriage, and gender division of labor within marriage in driving the trends in earnings inequality at the population-level should not be excluded if the aim is to understand the implication of changing marriage and family patterns on inequality across families (Schwartz and Mare 2005).

Data

I use four-wave data from the China Household Income Project (CHIP), which were collected in 1988, 1995, 2002, and 2013 by the China Institute for Income Distribution at Beijing Normal University in collaboration with a group of international economists and the Chinese National Bureau of Statistics (NBS)¹. The CHIP data are one of the most widely used household income data in China due to the long time-range it covers and its large sample size (Gustafsson, Li, and Sato 2014). Top incomes are not coded. In each survey year CHIP provides two separate samples for rural and urban households. The urban CHIP follows a multi-stage sampling strategy. At the first stage of each year, provinces that are representative of each of the four geographical regions of China are picked. The total number of provinces sampled vary from year to year, ranging from 10 to 14. At the second stage, a certain number of cities and towns from each of these sampled provinces are randomly selected (number of cities sampled depends partly on the budget in that year). At the last stage, households within these sampled cities and

¹ CHIP also has data for the year 2007, but the publicly available part of the 2007 data is a small part of the whole sample and not nationally representative. For example, in a recent famous study that uses the CHIP data series to study long-term trends in income inequality in China, the 2007 CHIP data is simply discarded due to this reason (Piketty, Yang, and Zucman 2017).

towns are randomly drawn from the household registration database of the National Bureau of Statistics (NBS).

Similar to previous research within the context of urban China, I restrict my analysis to urban married couples in which husbands are aged 22-59 and wives are aged 20-55. 22 and 20 are the legal minimum age of marriage for men and women in China, and 59 and 55 are the legal retirement age for men and women (Feng and Tang 2018). When more than one couple is present within a household, only the couple containing the head of the household is included because the data provide no information to identify the relation between non-household-head married residents. Couples in which either partner does not work due to disability or schooling are dropped (Schwartz 2010). This sample definition minimizes the measurement problems for the earnings among the younger or older population.

Although focusing on earnings of married couples exclude the contribution to household income inequality from other income sources and other household types, the results from this study should still be largely generalizable and theoretically interesting for two reasons. First, labor earnings have always been the predominant source of household income in urban China, and its effect in shaping the observed trends in overall household income inequality has been the largest (Li, Sato, and Sicular 2013). Second, despite China's rapid modernization, marriage is still quite universal. A 2005 Population Survey (mini-Census) shows that by age 35-39, almost all women and over 95% men are married (Ji and Yeung 2014). Marriage rates among poor men indeed declined in recent years, but the impact of this trend on changes in household income inequality has already been well studied in other research, while the role of the changing within-couple earnings association is still unknown (Feng and Tang 2018). After dropping cases with missing earnings, my final sample consists of repeated cross-sectional couple earnings data for 4 years (1988~2013) (N=20779).

Measurement

Annual earnings are defined as the sum of earned labor income (including salaries, non-wage compensation and non-monetary benefits) and the net income of self-employment minus income tax. This definition has been consistently adopted by previous research on similar topics under the same context of urban China (Ding, Dong, and Li 2009; Hu and Qian 2015). Those who have never worked for pay in the past calendar year are treated as having zero earnings. Those who reported valid work experience in the past calendar year but also reported zero annual earnings are treated as missing on earnings and simply dropped from the sample as the share of such cases is very small². Income from self-employment is included in the definition of earnings because exclusion of it would miss a key aspect of the contextual feature of urban China. The period under study (1988-2013) covers the important historical period of urban China's marketization. The rise of self-employment and private entrepreneurship constitutes a core component in China's economic transition from planned to market economy, and therefore plays an important role in economic stratification during this period (Wu 2006; Wu and Xie 2003). People with zero earnings are included in the sample to reflect the changing relationship between wives' assortative labor force participation according to their husbands' earnings level. Such a particular component has been found to play a non-negligible role in shaping the overall trends in couple earnings inequality in the United States and Germany (Gonalons-Pons and Schwartz 2017; Pestel 2014; Schwartz 2010). It may also have a significant impact in urban China as mentioned previously.

Earnings inequality across married couples is measured by the Theil index (also known as Theil's T). As one of the most popular inequality measure, the Theil index has been widely used in the sociological and economic literature of income inequality,

² Number of such cases ("invalid zero earnings"): 6 in 1988, 150 in 1995, 89 in 2002, 32 in 2013.

primarily due to its additive decomposability (Berry, Bourguignon, and Morrison 1983; Breen and Salazar 2011; Firebaugh and Goesling 2004; Weeden 2002). It is also thought to be a more suitable measure for income inequality than the coefficient of variation (CV) or Gini coefficient because the Theil index better reflects the diminishing utility of income (Allison 1978; Schwartz and Winship 1980). In sensitivity analysis not shown here, I perform the analysis using half the squared coefficient of variation (i.e. Generalized Entropy Index (2)) and the findings do not change.

Methods

To capture the complete structure of association between spouses' earnings, I divide husbands' and wives' earnings into 1000 roughly equal-sized groups (millicile) according to their earnings ranks within their own sex (results are robust if dividing into 500 ranks). Ranks of tied earnings are assigned randomly. My results are robust if changing the assignment to be based on spouse's earnings or the inverse of spouse's earnings (Reed and Cancian 2001). Then I replace the original earnings within each millicile by the mean earnings within that millicile, generating a new data set containing a new earnings distribution for each sex in each survey year. Formally, the earnings of the k^{th} couple in year t , $E_{k|t}$, are transformed into:

$$E_{k|t} = H_{r|t}H_{s|t} + W_{r|t}W_{s|t} , \quad (1)$$

where $H_{r|t}$ and $W_{r|t}$ are the male and female partner's earnings rank in year t ($H_{r|t}$, $W_{r|t} = 1, 2, \dots, 1000$). $H_{s|t}$ is the year-specific earnings scale for husbands' earnings rank in year t $H_{r|t}$, in which the earnings scale $H_{s|t}$ is simply the mean earnings of all husbands sharing the rank $H_{r|t}$. $W_{s|t}$ is similarly defined. The association between

spouses' earnings in each year is thus described by a time-series of very detailed nonparametric rank correlations between H_r and W_r for each year t . Because I have 1000 earnings ranks for each sex in each year, the new data set based on rank-specific earnings scales closely approximates the original earnings distribution and inequality trends. Below I shall refer to any quantity computed using this scale-based data set as the observed value for the sake of simplicity. This nonparametric description of within-couple earnings association has been widely used in previous literature (Austen and Redmond 2013; Burtless 1999; Reed and Cancian 2001, 2012). One of its advantages is that it is free of the effect of marginal changes in the distribution of husbands' and wives' earnings.

To evaluate the contribution of within-couple earnings association to trends in between-couple earnings inequality, I simulate the levels of couple earnings inequality in each subsequent year under the counterfactual that the rank correlation between spouses' earnings has remained in its pattern in the initial year. This is done by calculating the levels of inequality using the scale-based data set in which each couple's earnings are computed using equation (1), where the rank-specific earnings scales $H_{s|t}$ and $W_{s|t}$ are allowed to change from year to year as observed, but the earnings ranks $H_{r|t}$ and $W_{r|t}$ are held constant at their values in the initial year (i.e. 1988). The difference between this simulated trend and the observed inequality trend thus represents the contribution of changes in within-couple earnings association to trends in between-couple earnings inequality.

One shortcoming of this nonparametric method is that it does not tell which part of the changing association between spouses' earnings ranks contributes more (less) to the observed trends in earnings inequality across couples (Schwartz 2010). To overcome this limitation, I regroup the earnings of husbands into 6 categories, with 1 category for those with zero earnings and the remaining 5 categories for each of the 5 earnings quintiles, and does the same for wives' earnings. Because this regrouping scheme is also

based on earnings ranks, it is simply a crude version of the rank correlation above. The only difference is zero-earners are assigned a separate category so as to highlight the independent impact of the changing relationship between husbands' earnings and wives' labor force participation. Note that the original 1000-rank scheme is still used to capture the detailed association between husbands' and wives' earnings ranks as well as in all the subsequent decomposition analysis. I regroup them into 6 categories so that the impact of changes in the detailed 1000-rank correlation between spouses' earnings can be more concisely illustrated to readers. As will be shown in the Results section, it does not really matter whether it is regrouped into 6 or more categories, because changes in the rank correlation within the crude categories are still largely traceable. Cross-tabulating husbands' and wives' earnings' categories results in a $6 \times 6 \times 4$ table, with all couples being classified into 36 (6×6) groups for each of the 4 survey years.

The Theil index of the overall level of earnings inequality among married couples in a given year can be seen as an additive sum of the separate contribution of each of the 36 couple groups in that year:

$$T = \sum_j \left[p_j \left(\frac{\bar{x}_j}{\bar{x}} \ln \frac{\bar{x}_j}{\bar{x}} + \frac{\bar{x}_j}{\bar{x}} T_j \right) \right], \quad (2)$$

where $\bar{x}$ is the mean earnings of all couples, $\bar{x}_j$ is the mean earnings of couple group j , T_j is the within-group inequality³, and p_j is the population share of couple group j . The part in the square brackets represents the separate contribution of each couple group j to the overall inequality (Liao 2019; Shen 2018). This expression takes the form of $\sum_j p_j f(r_j)$ if

³ $T_j = \frac{1}{n_j} \sum_{i=1}^{n_j} \frac{x_{ij}}{\bar{x}_j} \ln \left(\frac{x_{ij}}{\bar{x}_j} \right)$, where n_j is number of individuals in group j , x_{ij} is the income of person i in group j , and $\bar{x}_j$ is the mean income of group j . Clearly, T_j is simply a group-size-adjusted measure of the earnings distribution within a group which takes the form of $r_j \ln r_j$.

we think the part in the round brackets $(\frac{\bar{x}_j}{\bar{x}} \ln \frac{\bar{x}_j}{\bar{x}} + \frac{\bar{x}_j}{\bar{x}} T_j)$ as $f(r_j)$. Below I will call $f(r_j)$ the disproportionality index. Equation (2) contains three elements. First, the core component of $f(r_j)$ is the earnings ratio $\frac{\bar{x}_j}{\bar{x}}$, i.e. the ratio of the group mean earnings to the population mean earnings. It measures the disproportionality of a group's average earnings, i.e. how far this group's average earnings deviate from the population mean. Second, T_j also uses the idea of earnings ratio to measure how far a group member's earnings deviate from the group's mean earnings. Third, a couple group's contribution to overall inequality through its disproportionality index $f(r_j)$ is then weighted by the relative size of that group p_j .

Any temporal change in the overall level of earnings inequality among couples can be decomposed into the sum of changes in the separate contribution of each of the 36 couple groups:

$$T_{t_1} - T_{t_0} = \sum_{j=1}^{36} [p_{j|t_1} f(r_{j|t_1}) - p_{j|t_0} f(r_{j|t_0})], \quad (3)$$

where t_0 and t_1 are the start and end points of a given period and $f(r_j)$ is the disproportionality index for group j as defined in the round brackets in equation (2). The part in the square brackets $p_{j|t_1} f(r_{j|t_1}) - p_{j|t_0} f(r_{j|t_0})$ represents the separate contribution of changes that happened within each of the 36 couple groups to the observed trends in couple earnings inequality.

Similarly, change in the level of earnings inequality among couples simulated under the counterfactual that the association between spouses' earnings had remained constant in its 1988 pattern can also be expressed as an additive sum of the separate contribution of changes within each couple group:

$$T_{t_1}^* - T_{t_0} = \sum_{j=1}^{36} [p_{j|t_1}^* f^*(r_{j|t_1}) - p_{j|t_0} f(r_{j|t_0})], \quad (4)$$

where $T_{t_1}^*$ is the simulated level of couple earnings inequality at the end of the period, $p_{j|t_1}^*$ and $f^*(r_{j|t_1})$ are the simulated share and disproportionality index of couple group j ($j=1,2,\dots,36$) when husbands and wives at time t_1 are forced to match each other's earnings milliciles as they did at time t_0 (see Appendix for an explanation about how change in the rank correlation between spouses' earnings milliciles can affect $p_{j|t_1}^*$ and $f^*(r_{j|t_1})$). Comparing the contribution of changes among each couple group j under the observed scenario to the contribution of each couple type j under the counterfactual scenario then tells us which of the 36 structural positions of the changing within-couple earnings association has contributed the most to the observed trends in between-couple inequality. Formally, change in the *proportional* contribution from couple group j to the observed increase in couple earnings inequality due to the changing rank-rank correlation between spouses' earnings, C_j , is calculated by:

$$C_j = \frac{\{[p_{j|t_1}^* f^*(r_{j|t_1}) - p_{j|t_0} f(r_{j|t_0})] - [p_{j|t_1} f(r_{j|t_1}) - p_{j|t_0} f(r_{j|t_0})]\}}{T_{t_1} - T_{t_0}}, \quad (5)$$

Descriptive results

Descriptive statistics of the four-year samples are provided in Table 1. The overall earnings inequality among married couples, as measured by the Theil index, keeps increasing during this period from .09 in 1988 to .24 in 2013. The most dramatic increase happened between 1995 and 2002, after which the inequality level increased only by .01 in the next 11 years. The dramatic hike in 1995-2002 is partly due to the radical marketization policy in this period, when many workers in state-owned enterprises were laid-off or forced to retire early as a result of the government's determination to promote

the urban labor market reform (Feng, Hu, and Moffitt 2017). Prior to the implementation of this radical reform policy, most urban workers still worked in the public sector with high degree of job stability (Ding et al. 2009).

[Table 1 about here]

The second row of Table 1 shows that the trends in spouses' earnings correlation among all couples, when measured by the Pearson's correlation coefficient, actually does not well mirror the trends in between-couple inequality in the first row. When between-couple earnings inequality witnessed its most significant rise during 1995-2002 from .12 to .23, the Pearson's correlation coefficient actually dropped slightly from .47 to .42. Similarly, when the overall inequality level remained almost unchanged during 2002-2013, the correlation coefficient experienced its biggest decline from .42 to .23. It should be noted that its level in 2013 is still relatively high if compared to other countries. For example, the spouses' earnings correlation in the United States ranged from .08 to .12 between 1967 and 2005 (Schwartz 2010). In South Korea, it fluctuated between -.08 and .06 during 1996-2011 (Ku et al. 2018). Change in the correlation coefficient is affected by both change in the correlation between spouses' earnings ranks and change in husbands' and wives' marginal earnings distributions.

The rest of Table 1 reveals the heterogeneity within the changing structure of within-couple earnings association that is not captured by single summary measures such as the Pearson's correlation coefficient. First, unlike the trends among all couples, the correlation coefficient between spouses' earnings among dual-earner couples largely remained constant at around .5. The next two rows report the percentage of husbands and wives with nonzero annual earnings within their own sex. While husbands' employment rate (i.e. percentage of nonzero earners) has remained above 90%

throughout the 25-year period, wives' employment rate declined by 16% from 92% to 76% during the radical reform period (1995-2002), and had hardly recovered since then. This is consistent with previous findings that the large-scale layoff shock had more negative impacts on women's than men's labor force participation⁴ (Ding et al. 2009; Wu and Zhou 2015). Such marginal changes in wives' earnings dispersion was found to account for 48% of the aforementioned dramatic increase in overall family income inequality between 1995 and 2002 (Ding et al. 2009). Finally, the trends in the share of dual-earner couples closely mirror the trends in wives' labor force participation (next row). The share of dual-earner couples also play a role in shaping the trends in the overall correlation between spouses' earnings because the earnings correlation is stronger among dual-earner couples. However, it is obvious that the trends in the share of dual-earner couples does not well match the trends in the overall level of the coefficient of correlation. From 2002 to 2013 the correlation coefficient dropped drastically but the share of dual-earner couples actually rose by 4%.

The last two rows report the percentage of wives with nonzero earnings whose husbands' earnings are in the top 10% and bottom 10% among all husbands. Clearly, the deterioration in wives' labor force participation is more serious among wives with low-earning husbands before 2002. In the initial year 1988, the difference in the rate of wives' labor force participation across husbands' earnings is still relatively small (87% among wives of bottom-10% husbands and 92% among wives of top-10% husbands). 25 years later, only 65% wives of bottom-10% husbands had nonzero earnings while 76% wives of top-10% husbands were still working. Therefore, although the overall level of correlation indicated by the correlation coefficient decreased slightly between 1995 and

⁴ My result is higher than women's labor force participation rate (63% in 2005) reported in Wu and Zhou (2015) because I am reporting the percentage of wives who have zero annual earnings, i.e. never worked for pay during the whole year, while Wu and Zhou (2015) reports the distribution of employment status "at the time when the censuses or survey data were collected" (Wu and Zhou 2015:322). Also, I delete those who do not work due to school or disability.

2002 from .47 to .42, the correlation between wives' labor force participation and their husbands' earnings actually strengthened during the same period of time. The trends are not linear, however. While the labor force participation among wives of top-10% husbands kept decreasing from 82% in 2002 to 76% in 2013, the labor force participation rate among wives of bottom-10% husbands actually bounced back to 65% in 2013 from 58% in 2002 after its sharp decline between 1995 and 2002. This is consistent with previous findings that the labor force participation of wives of poorer husbands has increased in 2000s in urban China, possibly as a result of rising living costs and economic pressure (Wu and Zhou 2015). The persistently declining share of working wives of richer husbands is also consistent with previous findings about the slight yet "visible" rising share of housewives among married women after 2000 in urban China (Gustafsson and Ding 2011; Li et al. 2013; Wu and Zhou 2015).

In summary, the descriptive statistics show that although my sample focuses on the earned labor income among married couples only, the core trends revealed here closely mirror those reported in previous studies that are based on more general samples or definitions of incomes (Ding et al. 2009; Feng et al. 2017; Wu and Zhou 2015). This is not surprising given the high marriage rates in China and the large share that earnings occupy in total family incomes among urban Chinese. More importantly, what is intriguing here is that the trends in the overall correlation between spouses' earnings does not well predict the trends in any of its subcomponents, including the correlation among dual-earner couples, the share of dual-earner couples, and the "assortative" labor force participation among wives according to their husbands' earning levels. This demonstrates that a single summary measure of the spouses' earnings correlation such as the Pearson's correlation coefficient may have concealed the huge heterogeneity in the impact on trends in earnings inequality of the various parts of the changing within-couple earnings association.

Contribution to trends in between-couple earnings inequality due to changing within-couple earnings association

Figure 1 contains the basic results of my simulation. If within-couple earnings association is held in its pattern in 1988, the between-couple earnings inequality turns out to increase by a slightly larger amount, meaning that changes in the former actually played an equalizing role during the period. Specifically, the increase in couple earnings inequality from 1988 to 2013 would be 6.8% larger if measured by Theil and 4.1% larger by Gini. The general picture is highly similar between Theil and Gini.

[Figure 1 about here]

Figure 2 shows the result from the same type of simulation but using a different inequality measure, the Palma Ratio, which refers to the ratio of the share of earnings among the top 10% to the earnings share of the bottom 40%. The Palma Ratio originates from the work by the economist José Gabriel Palma who empirically discovered that increases in inequality is mainly driven by the “increased diversity in the shares of the top 10 per cent and bottom 40 per cent” (Palma 2011:87), while the income share of people in the middle 50% (from decile .5 to .9) is rather uniform and homogeneous across time and space. Recent studies provide further empirical support for this observation and see the Palma Ratio as a useful compliment to Gini (which is oversensitive to changes among middle-incomes) and a better measure of income inequality in terms of its societal impacts (Cobham, Schlögl, and Sumner 2016). Clearly, the picture looks rather similar to that revealed in Figure 1. Since the Palma Ratio is mainly a reflection of the advantage of the upper tail relative to the lower tail of income distribution, Figure 2 provides suggestive evidence that change in within-couple earnings association affects trends in

earnings inequality among couples mainly through slightly reducing the relative earnings advantage of high-earning couples as compared to lower-middle and low-earning couples. This observation will be confirmed in subsequent decomposition analysis.

[Figure 2 about here]

To show how such a weak yet equalizing impact is generated, I decompose the difference between the observed and simulated amount of increase in the Theil index into the proportional contribution from changes in each of the 36 couple groups according to equation (4). The decomposition results are shown in Figure 3. The height of each bar reflects the size of the percentage contribution to overall trends in between-couple inequality due to changes at each of the 36 positions on the structure of within-couple earnings association. Although the overall size of impact is relatively small, there is a considerable degree of unequal contribution. The overall equalizing impact is mainly driven by changes in three cells, i.e. a dual-elite couple group in which both spouses are in the top gender-specific earnings quintile (-12.6%), followed by two groups of “female hypogamous” couples in which wives are in the top earnings quintile yet their husbands are in the second and third quintile only (-5.4% and -5.9%). The total size of the equalizing impact due to changes in within-couple earnings association concerning these three couple groups are actually quite large: in the absence of their contribution the increase in between-couple earnings inequality would have been 24% higher than as observed.

[Figure 3 about here]

However, their equalizing impact was largely offset by two other disequalizing contributors: the group of couples with the husband in the top earnings quintile and a non-working wife, and the group of couples in which the wife is in the top quintile among women and the husband in the second top (4th) quintile among men. Changes concerning these two groups accounts for 19.3% of the observed rise in overall inequality.

What are the (dis-)equalizing changes in within-couple earnings association that happened among these couples? In Table 2 I show the values of the two key elements in Theil index in equation (2), i.e. the population share of a couple group p_j and the group mean earnings relative to the population mean (income ratio r_j , or earnings ratio within our context), in 1988 and 2013 respectively. I choose three groups whose impact size is the largest as an example: the dual-elite group in which both spouses are in their gender-specific top earnings quintile (-12.6%), and the group in which the husband is in the top quintile and the wife does not work (9.9%), and the group in which the wife is in the top quintile among all wives and the husband is in the fourth quintile among all husbands (9.4%). As shown in the top panel of Table 2, mean earnings among all of the three groups increased significantly over the 25 years well beyond and above the growth of the population mean earnings, meaning that marginal changes in earnings among couples in all the three groups contributed much to the increase in overall between-couple earnings inequality.

[Table 2 about here]

However, the disequalizing impacts of these marginal changes are weighted in opposite directions by the compositional shifts in terms of within-couple earnings association. It reduced the share of the dual-elite group from 8.57% to 8.3% while raising

the share of the top-earning-husband-non-working-wife group from 2.94% to 3.69%. These are the “net” impacts of changes in within-couple earnings association after controlling for marginal changes, which are computed by comparing the observed share of a group to the simulated share of that group if the 1000-rank correlation between spouses’ earnings were held constant in its 1988 pattern. As can be seen in Table 2, the observed size of change in the population share of these two groups is actually even larger. In other words, compositional shifts in the relative sizes of these two couple groups suppresses the disqualizing impact of marginal earnings increase among the dual-elite group but enhances that among the top-earning-husband-non-working-wife group. Finally, when we force couples in 2013 to match each other like their counterparts in 1988, the ratio of the mean earnings of the top-earning-husband-non-working-wife group to population mean declines from 1.55 to 1.33, meaning that part of the disqualizing impact in the marginal earnings increases among this group is actually due to the changing rank correlation between spouses’ earnings miliciles that are not captured by the crude 6 x 6 illustration based on quintiles.

In fact, there seems to be a hidden yet fundamental change in the marriage and family behaviors among top-earning husbands in urban China. The bottom panel of Table 2 reveals that although husbands in these two groups are both in the top earnings quintile (among all husbands), in 1988 husbands in the dual-elite couples are more likely to come from the upper layer of the quintile, while 25 years later they are more likely to be from the lower layer of the quintile. In 1988 the mean earnings of the top-quintile husbands in the dual-elite couples were 9% higher than that of their counterparts with non-working wives, but in 2013 the latter is 10% higher than the former. Similar patterns apply when we do the comparison using the median earnings ranks (ranging from 1 to 1000). In other words, the real top-earning husbands in urban China are increasingly

more likely to have a non-working wife than to have a wife who is also in the top earnings quintile among women.

Table 2 also explains why change among the group in which the wife is in the top earnings quintile among women and the husband in the fourth quintile among men is disequalizing, accounting for 9.4% of the observed rise in inequality. The earnings ratio of this group increased during the 25-year period, from 1.3 to 1.6. In the meanwhile, its population share is also increased by 1% due to the “net effect” of changes in within-couple earnings association. However, it does not mean over time high-earning urban Chinese women are increasingly likely to have a husband who earns less than themselves, because my measure of within-couple earnings association is based on gender-specific earnings ranks. This group is actually better described as an equal-earner group in the sense that the wife and husband have similar earnings in absolute dollars. Table 3 shows the share of equal-earners among this group as compared to the dual-elite group in which both spouses are in the top quintile within their own sex. Clearly, the former contains more equal-earners in all years from 1988 to 2013. If equal-earner couple is defined as the wife’s share of total couple earnings lying between 40% and 60%, the share of equal-earner couples is 9-17% higher in this group than that among the dual-elite group. The advantage rose dramatically to 17-35% when we adopt a stricter definition in which the wife’s earnings share lies between 45% and 55%. In fact, according to the strict definition, in 2013 less than half of the dual-elite couples are equal-earners while above 70% of the group with top-quintile wife and fourth-quintile husband are equal-earners.

[Table 3 about here]

In other words, over the 25 years there is a tendency among high-earning women to move closer to the equal-earner family mode, and such a tendency accounts for 9.4%

of the observed increase in overall earnings inequality across couples. More high-earning women “moving” to equal-earner families comes with fewer high-earning women staying in families in which the husband is in the second and third quintile, which is the real “female-hypogamous” couples even in terms of absolute dollars. Shrinkage of the latter thus equalized the between-couple inequality by 11% because it suppresses the disequalizing impact of the marginal changes in their earnings (based on results not shown). In fact, the tendency towards the equal-earner mode is not limited to high-earning women. I calculated the share of equal-earner couples among dual-earner couples in 2013 as observed and under the counterfactual that within-couple earnings association remained in its 1988 pattern. If the broader definition of equal-earners is used (40-60%), the share of equal-earner couples in 2013 is 56% as observed and 49% if within-couple earnings association had not changed, meaning changes in within-couple earnings association increased the share of equal-earner couples by 7%. When the stricter definition (45-55%) is adopted, changes in within-couple earnings association will increase the share by 10% from 26% to 36%. However, only the increase of the equal-earner mode among top-quintile women produced substantial impact on the overall between-couple inequality because they are the ones who occupy particularly disproportionate share of earnings relative to their group size.

One important observation from the analyses so far is that the compositional shifts in terms of within-couple earnings association seem to always contain many conflicting forces inside. Strengthening of the association in one position necessarily comes with weakening of association in another position within the structure. If couples at both positions witnessed higher-than-average earnings growth over time, the strengthening of association in one position will enhance the disequalizing impact of earnings growth here, but it also means the weakening of association in the other position will suppress the disequalizing impact of earnings growth there. The level of

earnings inequality in total is thus often hardly affected, but important changes have indeed happened because economic resources such as earnings have been redistributed between different types of couples. For example, the above analyses shows that the *shape* of the earnings distribution among married couples in urban China has greatly shifted due to changes in the within-couple earnings association. In 1988, disproportionate share of earnings is mainly held by the group of dual-elite couples. Although women who are ranked as top-earners among their own sex did not have equal earnings in absolute dollars as the top-earning men, they are likely to be found in the same family. Twenty five years later, the impact of the disproportionate earnings share on overall between-couple inequality among this dual-elite group declined because fewer couples are found in this group. By contrast, a new type of families that also occupies disproportionate earnings become more popular, in which high-earning women are coupled with an equal-earner man whose earnings are also high but not top if compared to other men. In the meanwhile, the “real” top-earners among men are increasingly likely to have a non-working wife. Such important and interesting trends in the group-based *shape* of inequality are all due to changes in the within-couple earnings association, but they would be ignored if we only focus on the overall trends in the *level* of inequality.

Discussion

The key intuition underlying many studies on the relationship between marriage patterns and inequality lies in the presumed tradeoff between within-couple equality and between-couple equality: “[B]ecause spouses share resources, societies in which high earners marry other high earners and low earners marry other low earners will be more unequal than those in which high earners marry low earners.” (Schwartz 2013:459). The empirical evidence from recent studies, however, largely challenged this conventional wisdom. In fact, the impact of increasing similarity between husbands and wives in terms of

education or income on trends in overall level of inequality are often found to be not only weak but tend to alleviate rather than exacerbate household income inequality (Boertien and Permanyer 2017; Breen and Salazar 2011; Grotti and Scherer 2016; Hu and Qian 2015). In this regard, this paper reaches exactly the same conclusion. Had there been no change in within-couple earnings association, the between-couple earnings inequality in urban China from 1988 to 2013 would have increased by 7% more if measured by Theil index and 4% more if measured by the Gini coefficient.

However, this paper offers a natural explanation about why this impact is often weak and equalizing through a careful decomposition of the Theil index. On the one hand, over time high-earning wives are increasingly likely to have a husband with roughly equal earnings (in absolute dollars) and less likely to have a husband whose earnings are below theirs. The rise of equal-earner families among high-earning women disequalizes the distribution of earnings between couples. On the other hand, due to the gender earnings gap, the rise of equal-earner mode among high-earning women necessarily implies that these women's husbands are increasingly less likely to be top-earners within the male earnings distribution. In fact, the data shows that over time the top-earners among husbands are more and more likely to have a wife who does not work. The rise of sole-male-breadwinner mode among top-earning men equalizes the overall level of between-couple earnings inequality. The loss of an additional paycheck among top-earning men means a big sum of earnings are transferred from the top of the distribution to the bottom of the distribution where zero-earning women are located, which is equalizing. By contrast, over time urban Chinese women are less likely to have a husband who earns less than themselves and more likely to have an equal-earner husband. This implies an earnings transfer from the middle part of the distribution to the upper part, which is disequalizing. Since the Theil index nicely reflects the diminishing utility of incomes, the disequalizing impact of adding more to the already well-off women receives

less weight in inequality calculation than the equalizing impact of adding more to women with no earnings (Allison 1978; Schwartz and Winship 1980). As a result, the total impact on trends in the overall level of inequality due to changes in within-couple earnings association is weak and equalizing.

I want to emphasize that these two processes may not be mutually independent. If your wife is a top-earner among women, and you earn roughly the same amount of money as your wife does, then chances are you are not a top-earner among men because of the gender earnings gap, although your earning is high enough if compared among women. Therefore, when high-earning wives become more likely to have an equal-earner husband, it necessarily follows that they are increasingly less likely to be paired with husbands who are top-earners among men, because of the gender earnings gap. In urban China during the period under study, husbands who are top-earners among men are actually increasingly likely to have a wife who has zero annual earnings. The increase in the share of equal-earners (i.e. increasing earnings homogamy in absolute terms) among high-earning partners is accompanied by a corresponding decline in earnings homogamy in relative terms. Using urban China as an example, I show that except for the tradeoff between within-couple equality and between-couple equality implied by the conventional intuition, there is also a tradeoff between earnings homogamy in absolute terms and earnings homogamy in relative terms. Insofar as we have a gender earnings gap, increase in within-couple equality in terms of the rising equal-earner families can actually go hand in hand with increasing earnings equality between couples.

On the one hand, my results appear consistent with the “gender” account that there are more “earnings hypogamy” among top-earning men. This may be driven by changes in assortative mating such as the recent increase in female age hypergamy and status-exchange marriage between better-educated older men and less-educated younger women (Mu and Xie 2014; Qian and Qian 2014). On the other hand, what is missed by

the “gender” account is the increasing share of equal-earner families among high-earning women. The increasing egalitarianism among high-earning women and the declining dual-career mode among high-earning men seems to conform to the bigger account about the “unequal gender revolution” and the recent “return to patriarchal gender norms” in post-socialist urban China (Ji 2015). However, the empirical evidence offered here is not directly connected to any ideological change. Any interpretation in this direction has to be made with great caution. Facing growing economic pressure and rocketing living costs in the urban areas, it is likely that any change in either mate selection or division of labor within marriage is based on the rational choice made together by both parties of the union who share the same system of gender ideologies (Mu and Xie 2014; Qian and Qian 2014).

This paper has three limitations. First, since my analysis is based on cross-sectional data, it cannot determine whether the rise of equal-earner mode among high-earning wives and the rise of the sole-male-breadwinner mode among top-earning men is due to changes in assortative mating or shifts in division of labor within marriage (Gonalons-Pons and Schwartz 2017). Nevertheless, since young people are rarely found in the top end of earnings distribution, it is more likely that the trend is driven by the latter. In this sense, my analysis also sheds light on why recent studies found that change in division of labor within marriage often exerts a larger impact on trends in between-couple earnings inequality than change in assortative mating does (Gonalons-Pons and Schwartz 2017; Pestel 2014): because change in division of labor within marriage is more likely to concern changes among high-earners who usually play a larger role in determining the overall trends in earnings inequality.

Second, similar to all other household income survey data, the CHIP data used here also suffer from potential underreporting of top earnings. In this sense, the findings regarding top-earners described in this paper more likely reflect the behaviors of top-

earners among the remaining 99% (or even lower percentile, depending on the potential seriousness of underreporting) rather than the “real” top-earners in the top 1%. Finally, the “accounting framework” in this paper also means it does not directly speak to any causal effect. Instead, the analysis above is better described as offering a more detailed depiction of the relationship between within-couple earnings association and between-couple earnings inequality. Due to limit of space, I only present the results from Theil decomposition for the comparison between two years 1988 and 2013. Auxiliary analysis that compares 1988 to 1995 and to 2002 shows that the mutually-offsetting impact of changes in within-couple earnings association as revealed above started to emerge in 2002. This can also be seen in Figure 1 where the observed and counterfactual trends in between-couple earnings inequality almost overlap with each other before 1995.

The decomposition approach proposed in this paper improves upon previous research by building a clearer and more transparent linkage between the changing within-couple earnings association and trends in between-couple earnings inequality. For example, Schwartz (2010) found change in the within-couple earnings association among dual-earner couples had a larger impact on high-middle inequality than on middle-low inequality from 1968 to 2006 in the United States. Since the estimates of log-linear models are difficult to interpret, she returns to descriptive statistics based on the sample of dual-earner couples. Descriptive statistics show that the earnings of wives of top-earning-quintile husbands increased much faster than the earnings of wives of lower-earning husbands (Figure 3 in her paper). She concluded that “as expected on the basis of the descriptive statistics showing a disproportionate increase in the earnings of working wives with high-earning husbands (fig. 3), changes in the association between spouses’ earnings among dual-earners had the largest impact on trends in high-middle inequality and a smaller impact on middle-low inequality” (Schwartz 2010:1549).

However, it is unclear what changes in within-couple earnings association have happened

among dual-earner couples. The fact shown in her Figure 3 that the earnings of wives of top-earning-quintile husbands increased faster than the earnings of wives of lower-earning husbands does not necessarily mean the earnings correlation among high-earning couples has increased. It is equally likely that over time there are fewer couples in which both spouses are in top quintiles within their own sex, as is the case in urban China, as long as 1) the top-quintile husbands are on average more likely to have wives whose earnings are in the upper tail of the wives' earnings distribution than non-top-quintile husbands, and 2) the *marginal* earnings growth is more dramatic in the upper tail of wives' earnings distribution. In other words, the “disproportionate increase in the earnings of working wives with high-earning husbands” can result solely from marginal earnings changes among wives with no change in within-couple earnings association at all. This is just a guess and it cannot really invalidate Schwartz (2010)'s interpretation without reanalyzing her data. But it at least shows that, building on her innovative and monumental work, my decomposition approach hopefully improves upon the approaches in existing literature by making the analysis more transparent and traceable.

This article points to the fundamental nature of summary measures of income inequality as measuring overall level of inequality between individual units rather than measuring shape or structure of inequality between social groups (Jasso and Kotz 2008; Liao 2006, 2009, 2016). Recent research that focuses only on trends in the level of inequality conclude that increases in the economic resemblance between spouses are not important to understanding trends in family income inequality (Boertien and Permanyer 2017; Breen and Salazar 2011; Grotti and Scherer 2016; Hryshko et al. 2017; Larrimore 2014). By shifting the focus from the overall level of between-couple earnings inequality to the earnings differentiation between different types of couples, this article illustrates the merits of recent work in income inequality measurement advanced by sociologists

that emphasizes group differentiation and the social structural characteristics of inequality (Jasso and Kotz 2008; Liao 2009, 2016; Zhou 2012).

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Tables and Figures

Table 1 Descriptive Statistics

		1988	1995	2002	2013
Theil		0.09	0.12	0.23	0.24
Pearson's correlation coefficient	All couples	0.34	0.47	0.42	0.23
	Dual-earner couples	0.51	0.49	0.50	0.54
% Labor Force Participation	Husbands	97.99	97.79	91.72	95.93
	Wives	91.34	92.57	76.32	78.30
% Dual-earner couples		90.17	91.41	71.78	76.09
% Working wives of husbands with earnings in	bottom 10%	86.86	84.88	57.91	64.62
	top 10%	92.22	89.86	81.82	76.55

Data source: China Household Income Project

Table 2 Earnings ratio and group proportion among selected couple groups in 1988 and 2013

		Year	Couple Group		
			H5 W5	H5 W0	H4 W5
Earnings ratio	Observed	1988	1.83	0.93	1.30
		2013	2.51	1.51	1.64
	Association fixed at 1988 pattern	2013	2.58	1.33	1.58
Group size (%)	Observed	1988	9.29	1.73	4.61
		2013	8.30	3.69	4.50
	Association fixed at 1988 pattern	2013	8.57	2.94	3.51
Husbands' median earnings ranks		1988	928	894	
		2013	910	922	
Husbands' mean earnings		1988	10096	9296	
		2013	76251	83844	

Note: earnings ratio refers to the ratio of mean earnings of a couple group to the mean earnings of all married couples; group size refers to the population share of this couple group; H5 W5 is the group of couples in which both spouses are in their gender-specific top earnings quintile; H5 W0 refers to the group of couples in which the husband is in their top earnings quintile and the wife has zero annual earnings; H4 W5 refers to the group of couples in which the husband is in the fourth earnings quintile among men and the wife in the top earnings quintile among women. Husbands' median earnings ranks refer to the median earnings ranks of husbands in each group, where earnings ranks range from 1 to 1000 as defined previously. Husbands' mean earnings are inflation-adjusted to 2002 Chinese Yuan. "Observed" contains values of statistics as observed; "Association fixed as 1988 pattern" provides values of statistics if the within-couple earnings association is fixed in its pattern in 1988.

Table 3 Share of equal-earner couples in selected couple groups (%)

	wife's earnings share 40%-60%		wife's earnings share 45%-55%	
	H4 W5	H5 W5	H4 W5	H5 W5
1988	96	82	86	51
1995	93	84	72	55
2002	88	76	70	49
2013	88	71	72	48

Note: H4 W5 refers to the group of couples in which the husband is in the fourth earnings quintile among men and the wife in the top quintile among women. H5 W5 is similarly defined as in Table 2. Percentages shown in the table refer to the share of equal-earner couples in these two selected couple groups in each survey year. Equal-earner couples are defined in a broader and a narrower sense according to wife's earnings share of total couple earnings.

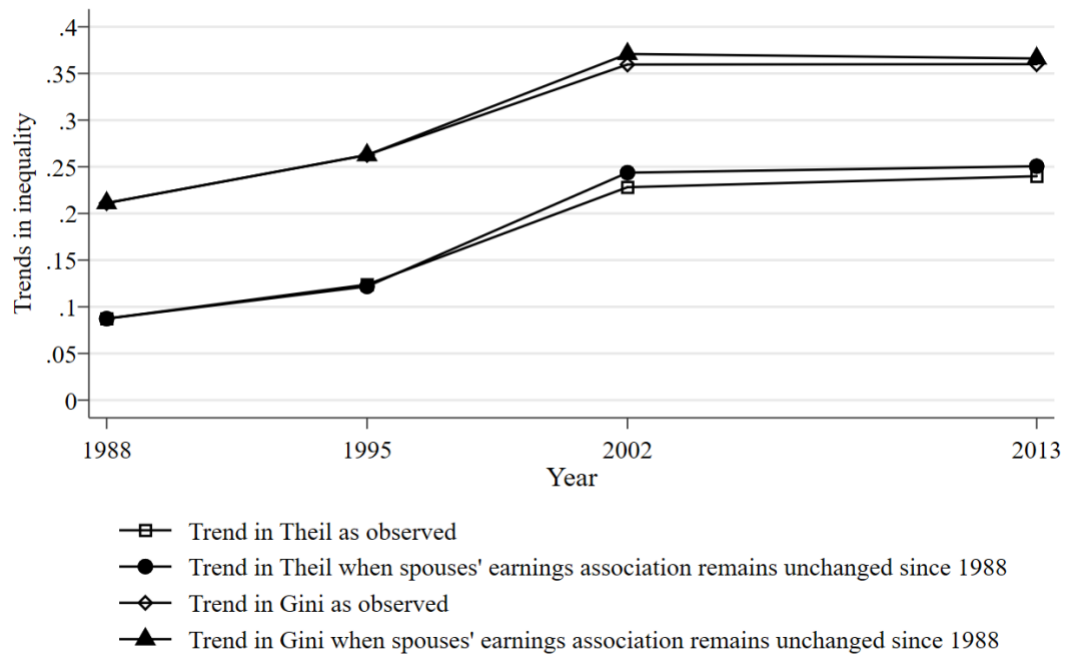


Figure 1 Observed and simulated trends in level of inequality among married couples in urban China from 1988 to 2013 (measured by Theil index and Gini coefficient). Simulated trends refer to trends simulated under the counterfactual that within-couple earnings correlation remains unchanged since 1988.

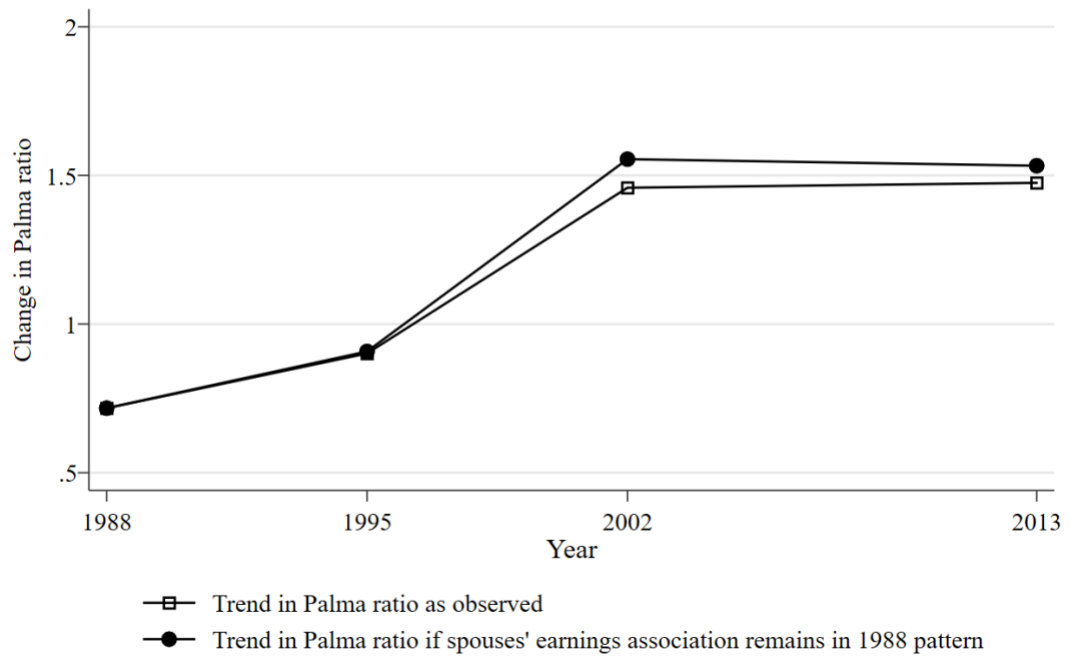


Figure 2 Observed and simulated trends in level of inequality among married couples in urban China from 1988 to 2013 as measured by the Palma Ratio. Simulated trends refer to trends simulated under the counterfactual that within-couple earnings correlation remains unchanged since 1988.

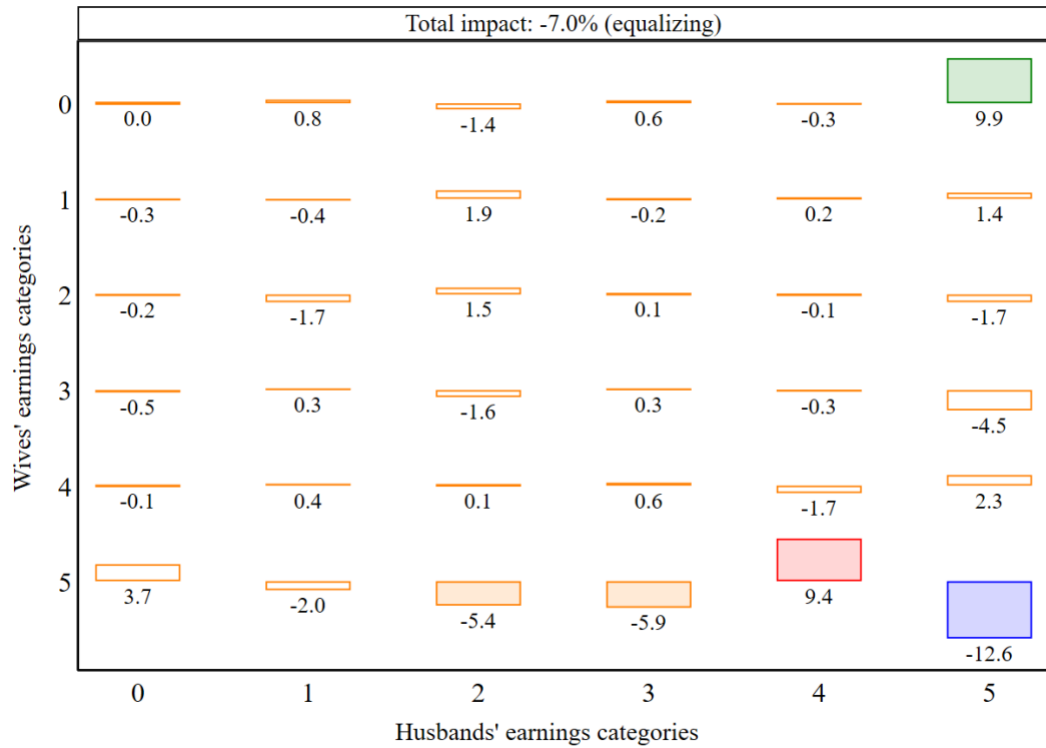


Figure 3 Proportional contribution of changes in different parts of within-couple earnings association to trends in between-couple earnings inequality.

Husbands' and wives' earnings are divided into six categories and cross-tabulated (one category for zero-earners and five categories for each earnings quintile for those with positive annual earnings). All couples are thus divided into $6 \times 6 = 36$ couple groups. Numbers shown below each bar represent the percentage of the observed increase in couple earnings inequality between 1988 and 2013 that is accounted for by changes in within-couple earnings association concerning that couple group as defined in terms of husbands' and wives' earnings categories. Negative values represent equalizing impact (couple earnings inequality would increase faster in the absence of changes in within-couple earnings association concerning that couple group).

Appendix

Change in the detailed 1000-rank correlation between spouses' earnings as specified in equation (1) affects trends in overall between-couple earnings inequality in three ways.

It is primarily reflected in changes in the distribution of p_j , i.e. the population shares of different couple groups as defined by the pairing of husbands' and wives' earnings categories. For example, a closer similarity between husbands' and wives' earnings ranks means there are more couples with similar earnings ranks, implying that the sizes of p_j on the diagonal of the 6×6 contingency table become larger.

Second, when more couples "move" into a certain couple group j , the within-group inequality T_j will also change. In most cases, when a couple group becomes larger, T_j will also increase, because a larger group often (though not always) means the earnings composition in that group is likely to become more diverse.

Third, because the 6×6 table is only a crude version of the detailed 1000-rank correlation structure, some changes in the latter will also manifest themselves in the earnings ratio $\frac{\bar{x}_j}{\bar{x}}$. For example, suppose more wives of top-quintile husbands choose to become housewives over time and the probability of these wives' retreat from the labor force is uniform across their husbands' earnings. Let us denote the amount of change in the ratio of the mean earnings of the couple group in which husbands have top-quintile earnings and wives do not work relative to the population mean earnings ("earnings ratio") as R1. Now suppose that wives of top-earning-decile husbands are more likely to become housewives than wives of husbands whose earnings are within the top quintile but not in the top decile. Denote the amount of change in the earnings ratio of the couple group in which husbands have top-quintile earnings and wives do not work under this scenario as R2. Obviously, R2 will be larger than R1. The impact of such within-quintile changes in the rank correlation between spouses' earnings will not be detected by the distribution of p_j because p_j stops at the quintile level. But it will be captured by changes in the disproportionality index $f(r_j)$. Such changes in $f(r_j)$ are still induced by the compositional shifts in terms of the 1000-rank correlation between spouses' earnings, but they manifest themselves in $f(r_j)$ because I choose to capture the correlation structure only crudely for expositional simplicity. Previous research assumes that changes in within-couple earnings association only affects p_j (Grotti and Scherer 2016; Schwartz 2010). Under my framework, it becomes clear that both p_j and $f(r_j)$ are affected if we aim to provide a detailed measure of the changing structure of earnings association.