

Women as Insurance Assets in Traditional Societies:

*A study of brideprices during 18th-19th century China**

Zhiwu Chen, Yale University

Shijun He, Tsinghua University

Zhan Lin, Renmin University

Kaixiang Peng, Henan University

2014.11.25.

Abstract

Before modern financial markets emerged, agrarian societies relied on non-financial means to mitigate risks. Women became an apparatus of insurance—they were traded for other resources when the survival of a family was under threat. This happened on different continents in places with little or no connections with each other. To examine how women were used in traditional societies as an insurance tool, this paper collected data on marriage- and adultery-related homicide cases from the Qing dynasty's Criminal Case Repots Archives. Of the 73,216 criminal reports from between 1736 and 1896 we identified 3,119 cases that contain price information on wife or concubine sale, widow remarriage, regular marriage, and bride-price. This dataset is then used to investigate if bride-prices would decrease significantly during times when human survival was under pressure or threat. In our analysis, grain price is employed as a proxy for the presence of survival risks: higher grain price signals a shortage of food supply and its severity. For example, a major crop failure due to drought or other natural disasters usually leads to extremely high grain price and challenges the survival of human beings, which pressures more husbands to sell their wives or daughters for liquidity. In turn, this may result in high supply of women on the market, causing supply-demand imbalance. The price of woman traded as wife or concubine, or "bride-price" (a term as used hereafter), will likely fall as a result. We find that grain price (i.e., survival risk) had the most significant impact on bride-price in 18th-19th century China: when grain price was high, bride-price would be low. Confucian influence also had a significant influence on bride-price: the deeper the Confucian influence (as reflected by a larger number of chaste women) in a region, the lower the supply of women on the marriage and resale market and hence the

* Zhiwu Chen, School of Management, Yale University and School of Economics, Peking University (Visiting Professor) (zhiwu.chen@yale.edu); Shijun He, Institute of Economics, Tsinghua University (hshj822@163.com); Zhan Lin, Institute of Qing History, Renmin University of China (linzhan126@126.com); Kaixiang Peng, School of Economics, Henan University (kaixiangp@qq.com). We thank Denggao Long, Weipeng Yuan, Debin Ma, Kang Wang, Yongwei Chen, Ruixue Jia as well as participants at the Second Quantitative History Annual Meeting for valuable comments. We also thank Xuemei Peng, Shixia Qu, Shujuan Liu, Wei Xu, Xiaobin Zheng, Hua Zhang, Tao Gui, Bofang Zhou, Shiting Zhu, Xinliu Yang, Shasha Li, Hao Jia, Liuyang Zhao, Yingmeng Jian, Juan Wang, He Xu, Guangwei Pan, Xiaobing Bao, Zhengliang Gao, Aolin Li, Jingzhu Li, Hui Liu, Lili Mi, Peng Shi, Xiaojin Wan, Zaihong Wang, Zhiqian Xie, Kang Zhang, Lingli Zhang for excellent research assistance. We are responsible for any remaining errors.

higher the region's bride-price, especially the bride-price for a widow. Our two-stage estimation using drought as an instrumental variable shows that in a drought year grain price would increase by 10% and cause bride-price to drop by 33%. Our findings support the hypothesis that, without financial markets, women were, indeed, used as insurance assets. In this sense, financial markets are fundamental to liberating the individual, especially women, from being used as economic instruments. Financial markets facilitate individual rights and freedom.

I. Introduction

Human survival faces constant risks. A drought, flood, earthquake, poor harvest, and other natural hazards can uproot a nature-dependent agrarian community. A study by Bai and Kung (2011) discovers that in the 2000 years of Chinese history between the Han dynasty and the end of the Qing in 1900, for example, drought was a major cause for nomadic tribes from the north to invade the Central Plains. This is to say even a shift in climate (an event risk) can result in war. A study by Jia (2012) illustrates that before sweet potato and corn—crops from the New World—were gradually introduced to China towards the end of the sixteenth century, whenever a drought occurred, on average eight prefectures out of 100 would see riots instigated by farmers. Changes in climate were the main cause. This happened not only in China but also other parts of the world such as ancient Egypt where natural hazards had been the reason for war (Fagan 2009). In Central America during the Mayan Empire, abnormal weather often led to war or other forms of conflict (Diamond 2006; Yancheva et al. 2007). These as well as other studies (Miguel et al. 2004) show that since the dawn of civilization, climatic changes and other changes to our planet, or even transitions between seasons have led to threats against survival that have caused human to resort to violence—seeking physical means for survival.

As human societies have always faced risks from natural hazards, then, what are their responses to survive these? One way is to use non-economic, non-monetary means such as cultural values, ethical norms and social organization to share risks and help each other. In a study, Kung and Ma (2013) show that in Shangdong Province during the few hundred years of the Qing dynasty, the more Confucian temples in a prefecture would indicate how much more deeply influenced by Confucian philosophies people there were. In such a prefecture, even in face of a natural disaster, the probability of farmers seeking violent means for survival would be relatively low. Families and lineages reinforced by Confucianism were able to share possessions and carry each other's burden as they dealt with the natural disaster, reducing the need for violence. Rosenzweig and Stark (1989) have found that in agricultural villages in India, families liked to marry daughters to faraway places from home (because the farther away the marital family, the smaller the probability that both natal and marital families would suffer from the same hazard). In other words, if a natural disaster was to strike where the natal family was, the chances that the marital family to be affected by the same disaster, if it was far enough away, would be low. Jia (2012) has discovered that sweet potato, when compared to other traditional Chinese crops—rice and wheat—is far less susceptible to effects of drought. Therefore, even during a drought when rice and wheat will not grow, farmers—instead of seeking

violence—can still grow sweet potato for survival. Since the mid-seventeenth century, sweet potato has been gradually introduced to Chinese agriculture, and farmers there have gradually become more resistant to droughts. The frequency of related riots has dropped by roughly 75%.

Of course, the solutions above only marginally improve the ability of a traditional society to respond to a natural hazard. They do not solve the threat problem from its root. Other methods are needed, and this paper examines one of them: human, particularly women. The method is to acquire a wife during a hazard-free year, and when a hazard strikes, selling her for food and other survival necessities. Modern societies may find this notion—treating women as a commodity of insurance—difficult to accept. Even within Qing laws there were clear regulations against buying and selling wives (Kishimoto, 2001)¹. In reality, however, not only did China have a long history of such activities as purchasing and renting a wife (Pan, 2010; Xia, 2004; Zhao, 2007), other places including India, Thailand, Africa, the Americas, Britain, France, Germany and other European countries have also had such customs (Gray, 1960; Goldschmidt, 1974; Thompson, 2002). Wives would be auctioned and sold much like other commodities and possessions. As early as in the first Babylonian Empire (1700 BC) there were regulations in the Code of Hammurabi on selling a wife to pay off a husband's debt, which in some cases were accumulated because of drought. This practice has continued into contemporary times in India (Sidner, 2009). Pan (2010) even writes, “whenever there was a drought, elders in the family would scan members of the household, and announce, ‘if the youngest and most beautiful eleven-year-old daughter-in-law is willing to be sold to another family, the money we receive in exchange will be enough to feed the rest of the family through the difficult time.’”² This kind of act—to sell one of the wives to offset survival threats—was a form of “self-insurance”³ against a food shortage or even famine in patriarchal families in the traditional Chinese society (Ha, 2004). Here, women were seen as a liquid asset used as an insurance apparatus against natural hazards.

In a society that lacks a financial market, the validity of the proposition “using women as insurance” depends on at least three questions and their answers: One, can a woman’s marriage or the purchase of a wife be equated to a regular transaction of a common commodity? Two, does the pricing of a woman for marriage follow economic laws the way regular trading of commodities does (that the seller seeks to maximize price, while the buyer minimizes it), and whether this pricing is influenced by various risks (as illustrative of its property of being used as a form of insurance). Three, how common is it for someone to sell his wife when his survival is under threat and he has no other options?

¹ Kishimoto (2001) mentions four scenarios in which selling a wife was allowed by Qing law: 1) If the wife had been adulterous. 2) If the wife had attempted to run away from her husband. 3) If the wife voluntarily wanted to be sold to another household to become a maid. 4) If the household faced destitution to a point that selling the wife was the only way out. It is quite clear that the fourth scenario was the one that made many such cases lawful at the time.

² See Pan (2010), p. 130.

³ Ehrlich and Becker (1972) call what someone does to minimize loss “self insurance”. This is a form of substitute insurance against risks on the market.

There has been much anthropological research related to the first two questions above. For example, Gray's outline of the history of marriage among African tribes (1960) provides an answer. According to him, in 1929-1931 there was a large debate on whether or not the term "bride-price" should be used to term any costs paid in exchange for a woman for marriage. At the time, not only did Africans resent the word, many anthropologists felt that adopting the term "bride-price" was an insult to African marriage customs. The reason was that the term equated marriages to transactions of everyday commodities with a buyer and seller. On the other hand, through systematically studying marriage arrangements and traditions from different African tribes, Gray has discovered that the key lies within the negotiation of gifts and bride-price and how they were to be delivered: the negotiation would be conducted by the parents of both sides, but neither the bride nor the groom was involved. Upon all agreed gifts and bride-price had been honored and their delivery properly witnessed, the bride must then be transferred to the groom's household. Meanwhile, all rights to using her and making arrangements for her had been handed over to the groom's—her marital—family. The marriage would only become legal when all promised gifts and bride-price had been transferred. (Without the delivery done in the presence of witnesses, any connections between the bride and the groom would be considered adultery, and was considered against the law.) Here, a "money upon receipt" element existed in this transaction as in regular financial or commodity exchanges. Gray discovers that different tribes in Africa used two models to transfer wives. One can be associated with the Sojo tribe: after a woman had been married, her husband was the only one who could decide whether she could marry again (be sold for a remarriage). In this course of events, a current husband would own his wife as if she was his asset, and he would seek to maximize her worth. The other model was found in the Tsonga and other similar tribes: every time a wife was sold she would go through her natal home. Symbolically this was her "returning" to her mother, and her mother would then transfer her to her new husband. Any gifts and money paid by the new groom's family would go to the natal family first. The natal family would then transfer those gifts and money to the ex-husband. In the first model, the husband played the role of the bank. In the second, it was the natal family that did. Gray also mentions that because these African tribes lacked modes of investment, a successful male would tend to keep his wealth in two forms of assets: goats and wives. when the number of goats reached a certain level they would be exchanged for more wives. If a natural hazard happened, the man could sell a wife for goats in order to raise his chances for survival, and vice versa. As a result, African marriage traditions not only treated women as assets and outlined the right to their control very clearly, they also treated the payment of the bride-price a crucial media of the exchange of asset, which would be the wife herself. Although Gray has not done a quantitative study on bride-prices in Africa, he, however, has briefly mentioned the relationships between the price of a wife and her natal family's social status, and her appearance and beauty. His conclusion is that marriages and everyday transactions of goods were identical, a woman was an asset, and her bride-price was her value.

China has had a long history of using human for economic purposes. An example of this is the notion of "raising the young as for old age support" (Chen,2009): using one's own offsprings as a safety net against risks due to old age or

decline in health. Since Confucius and Mencius laid down, more than two thousand years ago, the foundation of what has come to be known as Confucianism with its three cardinal guides and five constant virtues, and especially after the Han dynasty when Confucianism was systematically imposed on the society, a male parent has come to hold unquestionable authority and control over any assets within his family including ownership rights over his children and power over their marriages and lives in general (Lang 1946). The three cardinal guides assure that parents have control of their children, and confirm that a husband has total ownership of his wife. Cheung (1972) uses modern property rights theory as the framework for his detailed analysis on the complete procedure of a traditional Chinese marriage. He thinks that a marriage becomes no more than a typical transaction of assets if every part of it follows “orders from the parents and instructions of a matchmaker.” Upon the delivery of money and gifts, the actual wedding has been reduced to nothing more than a ceremonial conclusion, which finalizes the transaction. The three Confucian cardinal guides and five constant virtues have outlined, in theory, who owns whom and who has decision-making rights over whom within a family, so in this regard the structure of a family is clear. This unambiguity reduces the cost of selling wives and children. In the past, during an arranged marriage, only the parents of both sides would negotiate the bride-price and other conditions through the use of a matchmaker; the young bride and groom could only meet each other for the first time after all decisions had been settled and all procedures were underway. This illustrates that there was little consideration beyond pursuits of financial gain, so whether there existed any affections between the marrying couple at all was not a matter of concern. Essentially, the marriage was merely a transaction of commodities. Because of this, we do not distinguish between “bride-price” and “price”, the “groom side” and the “buyer”, the “bride side” and the “vendor” in this paper; we use these terms interchangeably for convenience.

Pricing a woman for marriage has not been exclusive to traditional Chinese and African societies. This practice also occurred in Britain until the late nineteenth century. According to Thompson (2002), from very early on there was a system of buying and selling wives within the British society. The system involved several key elements: One, the husband put a halter around his wife’s neck and held the other end of the rope with his left hand. He would then parade her at the market square three times, announcing the commencing of her auction. Two, there was a bidding process at the end of which the highest bidder would acquire the woman being auctioned. Three, the highest bidder (now the buyer) would have to pay in full (right there and then) before he could take the wife home with him. In Britain during that time, the transactional nature of ownership over a wife was very clear. According to Levine (1997-2001), since before 2000BC, Judaism literature has recorded marital events with such terms as “buying” and “acquiring” a wife that are loaded with transactional and ownership connotations. In addition, the bride-price paid belongs to the father of the bride.

Why is it that there seems to be the tradition of treating women as a commodity in the history of different societies from different parts of the world, to a point that similar practices such as putting a halter around the wife being sold has been observed in both Britain and China, two places separated by a vast distance? This has to do with the fact

that human societies share a universal truth that they face risks from natural hazards. Before the modern financial market has provided insurance and hedging means, humans did not have many effective tools to alleviate risks, so they resorted to using themselves. Raising young children in preparation for old age, and buying a wife as insurance for potential needs in the future are just two examples. Precisely because of these needs human societies gradually come up with various ways to restrict freedom that, over time, have become a culture: when both men and women stay within their “boundaries”, the risks faced by children and women, as a form of insurance, will be reduced. Different places having similar customs of this makes one thing clear: in the past, without a financial market, it follows naturally that women were used as insurance against life risks.

Maddison (2001) estimates that the average income of a typical Chinese man did not improve much before the Self-Strengthening Movement in 1870. Especially during Qianlong’s reign when there was pressure for the population to grow, many families hovered near basic living standards. If they were to face any natural hazards or shortages of food, their livelihoods would be severely challenged (Bengtson, 2004). Under those circumstances, what Pan mentioned (2010)—wives being traded when one faced diseases, injuries and natural hazards—would no longer be a surprise to see (Zhao, 2007). Nevertheless, even though literature today contains a lot of research on the selling and buying of wives in traditional China and other societies, the studies have been selective about the cases examined, so only minor conclusions have been drawn with a few samples in consideration. No systematic answers have been provided for the second and third questions above on the notion of “women as insurance assets”, based on quantitative examinations of a large sample of data.

To systematically investigate this notion, we begin with records obtained from the First Historical Archives of China. We sort through all records for cases that involve wife purchases and widow remarriages, as well as other ordinary marriages. We have found 3,119 cases with adequate information, out of 73,216 cases on marriage and extra-marital affair matters from the Qing dynasty between 1736 and 1896. Afterwards, we examine patterns of pricing women in *tongyangxi* (童養媳 child bride—a girl sold to a boy’s family as a maid when she is still underage, with the intention to have her marry the boy when both have grown to adulthood), first marriages, purchase of married women for remarriage and widow remarriages for any observable regularities, on the one hand. On the other hand, we systematically examine whether bride-price decreases when there is higher risks, in order to identify any elements of insurance in the course of fixing a bride-price.

During our analysis we face a challenge: even though we see that in those years where there have been high risks against survival (e.g., drought-plagued years), the probability of a marriage or wife purchase being the cause of a later homicide has increased. However, we cannot tell for certain the exact number of transactions that have involved the purchase of a wife or widow from a particular year in a particular geographical location. Consequently we cannot compute the difference of the number of these transactions between normal years and years plagued by natural hazards. Nevertheless, we use “price” instead of “volume of transaction” as our measure for analysis. In general, we use food prices as a proxy for survival risks, i.e., the more severe the shortage of food, the more risky it

is for survival, and food prices will rise more. At the same time, if more families are forced to sell their daughters away for marriage because they face survival challenges, causing a rise in the supply of brides on the market, if that also coincides with a less than normal demand for brides, then prices will decrease to below normal levels. As a result, the severity of survival risks is reflected by food prices, and women's value for insurance purposes is indicated by their prices. In other words, the hypothesis "women as insurance assets" is synonymous with the "negative relationship between bride-price and grain price."

Through examining bride-prices in the Qing, we find that food prices have had the most noticeable impact on them: when risk events led to a rise in food costs, bride-prices for already married wives decreased significantly, but gifts and bride-price for a daughter sold for the first time for marriage would only be affected marginally. This indicates that during a time of crisis, wives were sold more often than daughters. This supports our hypothesis, and through our quantitative analysis, we verify conjectures by other scholars including Pan. Using drought as an instrumental variable in a two-stage regression analysis estimates that in a drought year when grain price goes up 10%, bride-price drops 33%. Also, how much have the idea of chastity and Confucian teachings on women affected bride-prices. Where there is a more deep-rooted Confucian culture (where there are a lot of chaste women on official records), women have a lower tendency to remarry. This leads to a lower supply of women on the market, and prices of them, especially of widows sold for remarriages, become higher.

This paper attempts to achieve three goals: the first, we formally propose the theory "women used as an asset of insurance", which will help deepen the understanding of the history and origin of wife-purchasing activities. The second, this paper is the first to quantitatively analyze test, based on a large dataset, the validity of the hypothesis on traditional societies. For example, historians have in numerous occasions agreed that during the Qing, wives were being sold and bought for the purpose of insurance (Wang, 2000; Guo, 2000; Pan, 2010; Kishimoto, 2001, etc.), but no studies have verified this claim through large data investigation. the current paper is the first attempt of its kind. Regarding African societies, Gray (1960) has mentioned that the pricing of wives is affected by the supply and demand for them. Goldschmidt (1974) has discovered that the price of a wife there tends to decrease during a year plagued by disasters, but the sample size in his study have been limited. Though Thompson (2002) collected data from Britain between the years 1780 and 1890, he did not have detailed data on bride-price, so he has not been able to examine the validity of the hypothesis. The last, our study illustrates how the modern financial market lays the foundation for human liberation especially for women. The financial market frees human from acting as financial tools. Even though using women for insurance appears necessary and unavoidable in the absence of a financial market, it pays a hefty price: it obliterates women's spirit and sacrifices their freedom of choice.

The rest of the paper is arranged as follows: Part two puts forth the hypothesis "women as insurance assets". Part three introduces our data set, which contains marriage-related cases collected from the criminal reports in Qing Dynasty, describes samples statistics and computes simple correlations between natural hazards, food prices and

prices of women. Part four is a quantitative analysis on the data and a test of the hypothesis. Part five examines and discusses the robustness of our interpretations. Finally, we state our conclusions.

II. The Hypothesis—Women as Insurance Assets

In a society with no financial markets, it is inevitable for men to treat women as insurance assets. According to Herlihy and Klapisch-Zuber (1985), even though in 1425 Florence possessed the world's most advanced financial market, among the wealthiest Florentine families of the time, about 25% of their assets would comprise investments in land and real estate, 40% in operational assets such as trade, commerce and handicrafts, and only 35% in financial assets such as bonds, insurance and loans. Florence, as the birthplace of the Renaissance, was, at the time, leading Europe out of the Middle Ages. Banks and other financial institutions had emerged, but even the wealthiest families had financial makeup with proportions not dissimilar to the above. It took other societies until the nineteenth or twentieth century for financial utilities to become a major part of their assets. For example, Yun (2010) has studied cases from eighteenth-century China that involved officials having properties confiscated by the state. Yun has systematically examined the wealth structure in each, and discovered that at that time, the wealthiest families adhered to a portfolio scheme that divided assets into three equal parts: one for land and real estate, one for commercial assets, and the rest for precious metals and antiques. Bonds, insurance, securities, funds and other impersonal financial tools had yet to appear in China.

For the general public in a traditional agrarian society, impersonal financial concepts appear even more inaccessible. Be it China or India in Asia, Britain in Europe or Tanzania in Africa, during a time when the country relied on agriculture, ordinary farmers normally did not have a lot to save. Even if they had accumulated some wealth it could not have been much, no more than some land, a few houses, cattle and other resources for production. These tangible assets were a way of investing in the future, and at the same time act as insurance. People in traditional societies did attempt to find other arrangements to mitigate risks of natural hazards. For example, as Rosenzweig and Stark have discovered, in farming villages in India, when a disaster struck, families with daughters married off to faraway places coped much better than those without. Marrying daughters away raised their survivability. In Africa, people sold cattle and other resources of production as a buffer for natural hazards (Udry, 1994). In India, the bull is sacred. Farmers raise a bull to plough the fields at regular times. When a disaster arrives, that bull can be sold for cash, effectively an insurance instrument against adverse weather shocks. (Rosenzweig and Wolpin, 1993).

Even though land, real estate, cattle, antiques and old artifacts can be tools of investment and insurance, they require adequate "leftover" wealth, which, for common farmer is usually not affordable. In contrast, sons, daughters and wives are a convenient form of insurance. This, in essence, is "raising the young as a precaution to old age". In reference to the theory of property rights, Coase (1959) makes it clear that the definition of rights is a prerequisite for market exchange. In order for children and wives to be an insurance tool, it must first clearly define whether children are the property of their parents, and whether the parents have control over and should profit from the sale

of their children, and whether a wife is subject to the control of her husband, etc. Delimitations and regulations of ownerships and owners' rights must be clear, since ambiguity will push up the cost of trade. This is why African tribes and traditional societies in China and Britain had very detailed norm and rules regarding marriages and the sale of wives (Gray, 1960; Cheung, 1972; Thompson, 2002): For example, a child's first marriage should be arranged by his or her parents, the sale of a wife is controlled by her husband, and whether a widow can marry again is the decision of her mother-in-law, etc. This is also the meaning of the hierarchy outlined by the three Confucian cardinal guides and five constant virtues—the ownership of children and wives are clearly defined: before a daughter gets married, she is the property of her father. After marriage she becomes the property of her husband. The wedding ceremony signifies and realizes the transfer of the ownership of this asset, the daughter-turned-wife.⁴

In traditional China, when one reaches the suitable age for a first marriage, a set of procedural rituals is required before the marriage can proceed: *nacai* (納採), *wenming* (問名), *naji* (納吉), *nazheng* (納征), *qingqi* (請期) and *qinying* (親迎). During *nacai*, parents of the groom invite a matchmaker to propose to the parents of the bride. If the bride's parents accept the proposal, the groom's parents will ask the matchmaker to inquire about the bride's name and age (her particulars). This is known as *wenming*, literally "name asking". After that, the groom's family performs fortune-telling based on the bride's and the groom's birthdays. If they match in fortune, the groom's family will inform the bride's family. This is known as *naji*. The groom's family then sends gifts and money (the bride-price) to the bride's family. This is *nazheng*. During this stage, there will also be discussions on the wedding date. Finally comes *qinying*. This means that the groom's family sends a bridal sedan to carry the bride over (Chen, 1990; Guo 2000). According to records in the *Daqingtongli* (大清通禮, Common rituals of the great Qing), these six were prerequisite steps to a legitimate marriage. There were various simplifications or modifications on these steps in some places, but the key was that a marriage was a decision made through the "parents' order and the matchmaker's instructions". The bride and the groom were left out of the decision making, and they usually only got to meet each other during the final stage. Of note, in particular, is that *nazheng* was a step that could not be done without. According to Gray (1960) on certain primitive African tribes and what Stone (2011), Thompson (1993), etc have revealed about pre-nineteenth century British marital customs, African, British and Chinese marriage procedures were largely similar. Each involved parents of both the bride and the groom overseeing all matters and their children following their decisions.⁵ Also, in each case, marriages would only become legitimate upon all gifts and money (the bride-price) had been paid in full and the delivery properly witnessed. Such details prove that marriages in

⁴ A clear and significant difference between wives and children, and land and other assets is that a human possesses her individual will and may use whatever means to resist anything imposed upon her against her will. In other words, it is more difficult to define ownership of people than land, causing human resources to cost more. This is also why Confucianism emphasized the definition of an individual's role and association in both a family and society. If not, various trades and transactions would suffer from unaffordable costs. During a natural hazard, however, a woman being sold might not be absolutely negative towards her survival. She might receive less ethical support if she resisted her sale, lowering the cost of her transaction.

⁵ Modern property rights theory outlines four components to private ownership of an asset: the right to enforcement of property rights of the asset, the right to use it, to earn income from it and to transfer it to others. Traditional societies clearly treat children as properties of their parents; this is illustratable by the fact that parents could order children to do labour work claim all generated profits. They also have the right to sell the children, and even if they inflict any injuries on their children they would be protected from facing prosecutions. In traditional societies, arranged marriages—where children did as they were told by their parents—were commonplace.

traditional societies focus on the monetary rather than the emotional part. This is in line with what Cheung (1972) has suggested, that traditional marriage arrangements and everyday transactions of assets are identical. Both are the transfer of the ownership of a certain property.⁶

The procedures for buying and selling wives are also strikingly similar across different countries. During the Qing dynasty in China, the criminal law forbade the sale of wife except in several cases, such as the wife being adulterous, attempting to flee from her husband, willing to be sold to another family as a maid, or the husband being ill, handicapped or in destitution (Kishimoto, 2001). However, precisely because of the leniency the law provides for these 'exceptional situations', the practice of trading wives had never gone away. According to customs, a valid transaction must have witnesses, a draft of a "contract" stamped with both parties' fingerprints and the delivery of the bride-price. Only then could the buyer claim ownership and control of the woman. Common in the theatres of 1820s and 1830s in Ding county of Hebei province was a musical titled "Erhuanji" (耳環記, "The Tale of Earrings"), which reflected the reality of buying and selling wives as a custom of the traditional Chinese agrarian society. Xia (2009) summarized the essential plot elements of "Erhuanji" as: One, there was a recognized market where wives were sold, and its location was known to both sellers and buyers and other locals. Two, the seller called, "Who has come to purchase a wife?" Three, the woman being sold wore a grass stalk to mark her as "for sale". Four, both buyer and seller engaged in intense bargaining, until they finally agreed on a price. Five, the seller passed both the grass stalk and the wife to the buyer. Upon receipt of payment, the transaction would be complete. In comparison, Thompson (2002) writes, in his introduction to late nineteenth-century British traditions, "The sale of a wife was by no means a casual, and rarely a comic, affair. It was highly ritualised; it should be performed in public and with accepted ceremony." British people sold wives in roughly two steps: One, a halter was put around the neck of the woman for sale, and she was led to the open market with a rope and the halter. An energized auction followed and was won by the man who offered the highest bid. Two, once the price on the woman had been settled, concerned parties moved to a nearby pub. There, the buyer handed over the agreed payment, and signed a purchase agreement in the presence of witnesses. Finally he led the woman away with the rope.⁷ Thompson emphasizes that the key to the purchase were the halter, the public auction and the payment, or else the transfer would not be legitimate or legal. This shows that the practice of selling wives in British history is similar to that in the Chinese tradition. According to Gray (1960), many similarities can be observed in Africa's wife purchasing customs as well.

The reason that both rules and procedures for marriage in traditional societies were similar was that before the development of financial markets, children and wives were traditional societies' vessel of insurance and investment, and marriage procedures was treated by the bride's family as if they were steps of a transaction of an asset; the

⁶"Her marriage separated her economically and legally from her family, and transferred all her rights as well as ownership of her to the family that accepted her." (她的婚姻从经济上和法律上把她同自己的家庭隔绝开来, 并将属于她的权利和拥有她的权利转移到了接受她的家庭). (Cheung, 1972)

⁷One of the cases provided by Thompson (2002) happened as follows: Rodney Hall, a laboring man of idle and dissolute habits ... led his wife into the town with a halter round her body ... He led her twice round the market, where he was met by a man named Barlow, of the same class of life, who purchased her for eighteen pence and a quart of ale.

bride-price in question would be the value of that asset. This logic explains why even though traditional societies on major continents didn't interact with each other, they all share similar customs of buying and selling wives. These customs had stemmed from a common origin: the need to respond to threats against survival with minimized costs (Pan, 2010; Gray, 1960).

Ownership of land and real estate is necessary for survival in ancient China. Land ownership, due to its non-movability, has always been retained and circulated within the same tribe of people. Facing a natural hazard, a family, including real estate owners,⁸ tends to sell those movable assets (include family members) and retain ownership of fixed assets. The question is, however, why are only women being sold and bought, and not the men? The reason lies in the fact that in a male-dominant society, assets belong to the men. In *The Origin of the Family, Private Property and the State* (1884), Engels mentions that since human became an agricultural species, men no longer had to hunt for a living. Especially after iron ploughs were used, within a community there developed a severe and obvious imbalance in the difference in capabilities between men and women, leading to the prominence of male-dominant societies.⁹ According to Cheung's interpretations (1972), with this imbalance in advantages, if a man was to be sold, then the costs of that transaction would be too high, far surpassing those for the purchase of a wife or daughter. This is to say, in a male-dominant society, it was much more difficult to accept the practice of a son-in-law in the bride's family (上門或倒插門女婿) than the wives bought in the groom's family.. A sold groom would perhaps never be able to adopt his wife's family as his own the way a bride would be able to adopt her husband's. Clearly, the difference in costs between purchasing a husband and a wife had much to do with the fact that the society they inhabited was patriarchal, not matriarchal. This also explains why in a patriarchal society, when a family faced survival risks, its female members as opposed to the male members would be used as insurance properties. Another direct reason for this is that in a patriarchal society, a husband would own all assets in the household including his wife and his children. An asset owner would only sell his assets, not himself.

Modern economic development mostly concerns using impersonal tools as a substitute for human resources as risk insurance. This includes the financial market, the church, social insurance or welfare systems, and other forms of governmental social welfare. On the one hand, families raise their own ability to mitigate risks by owning such things as savings, land and real estate. On the other hand, the development of a financial market leads to a broader allocation of risks and wider spread of costs in risk alleviation. Social insurance gives both families and individuals the most affordable insurance and ultimate protection. These developments free women as a financial tool.

III. Descriptions of Data and Variables from Homicide Reports

⁸ When faced with famine, whether people would sell assets before wives or wives before assets varied from place to place. For example, volume (卷) 14 of *Linjinxianzhi* (臨晉縣志) in the Republican era contains this description: "People are famished, so they sell wives and children and assets and businesses. Words cannot describe how pitiful it is." (飢民鬻妻賣子，去產變業，艱苦情形，不堪言狀) And both *Ruichengxianzhi* (芮城縣志) and volume 14 of *Yonghexianzhi* (永和縣志) from the Republican era contain the line "They begin selling properties and businesses, then they sell wives" (始則出售產業，繼則鬻賣妻子), which makes it clear that people did so in response to famine.

⁹ Alesina, Giuliani and Nunn (2013) use cross-national, cross-geographical data for quantitative research and find that "iron-plough" societies tend to have more patriarchal generations than non iron-plough ones—men are favoured over women. Even when people from these societies migrate to modern (more liberal) countries such as the United States, they continue to pass on such cultural biases to subsequent generations.

1. Data source

To test the above “women as insurance assets” hypothesis, we need a large sample on marriages, wife selling and widow remarriages, including bride price, wife selling price and information on both families’ social statuses, means of transaction, we also need climate and droughts data to measure risks. Ideally it would be good to have all information on the volume and price of women transaction, then we can direct test the differences of volume and price of women transactions between normal years and disaster years, which will help to measure the degree that women have been used for insurance purposes. Unfortunately we cannot find all statistical information from all years, of all places, so we elect to use prices of women, which is our explained variable, to measure supplies and demands on the wife market. Regarding risk events, we measure them using two indicators: average rainfall and grain price from each prefecture.¹⁰

The Qing criminal cases used in this paper come from the First National Historical Archives of China. The records contain criminal cases of serious nature from all over China between 1736 and 1895, usually homicidal. According to the archives’ electronic search system and its classifications, criminal reports are classified into “cabinet legal records on land-related debts” and “cabinet legal records of marriages and adultery cases”. This paper uses any cases from the latter that involve marriage, wife purchase, sexual perversion, etc., and everyday domestic violence leading to homicide. The records contain how these cases would be handled through different levels of the legal system, including who reported the case and when, and who recorded the case, results from autopsies, and information such as citizenship, birthplace, gender, age, occupation, family structure and circumstances on witnesses and suspects, and how they were related to the victims. More details on these legal cases can be found in Buoye (2008), Ni (1992), Huang (1987), and the First Historical Archives of China (1985). For convenience of illustration, the rest of this paper will refer to the data collected from the legal cases as “data on wife-related homicides” or “data on wives”.

There are four advantages of using criminal records as the source of this study. They are: One, the volume of the samples is large; its scope covers extended time, geography and space, including data from all years and regions of the country from the Yongzheng (雍正) to Xuantong (宣統) era. Data collected as such is not only systematic but have complete coverage. This avoids any biases caused by selectivity of particular example cases. Two, legal cases from the Qing are perhaps, of all historical sets of data that cover a prolonged period of time, the one that is most systematic, completely reflective and representative of the various sociological aspects of China. Even though what have been recorded are marriage- and family-related homicides, because the causes of these cases are usually conflicts very commonly found in the society of the time, these samples give a fundamental picture of the overall social scene. (Buoye,2008) ,Wang,2000) Three, legal cases provide information on individuals from both the bride

¹⁰The logic behind using grain price to measure the degree of natural hazards is this: the more severe a hazard, the more significant the food crisis it causes, and the higher food prices will be. According to previous studies on industrial societies, every 10% drop in crop harvest leads to a 5% increase in food prices (Parenti, 1942). Food prices also reflect spending shocks: studies on developing countries have found that an agrarian household’s expense has flexibility towards food prices somewhere between -0.37 and -0.66, which means that if food prices rise by 30%, this household will spend 12%-20% less on food (Dasgupta, 1993). For an agrarian household that operates very near the edge of subsistence, this presents an enormous challenge. This type of risks (or pressure on survival) is often measured using food prices.

and groom's families. Four, because legal cases have been managed under strict legal proceedings and codes, they are a true record of what has happened. As a result, they are a lot more authentic and authoritative, and are more convincing than mere hearsay.

Currently there are 73,216 traceable cases of adultery-related matters from the Qing dynasty between the years 1736 and 1896. We examine the records one by one and filter any cases that involve marriages. From each selected case we record the time of marriage, place, gifts and price paid for the bride, the type of wedding and characteristics of the buyer, the seller, and the woman being sold (including gender, age, nationality, occupation, educational level, size of their family and status, etc.). In the end, we have 3,119 samples that contain information of bride-price and other gifts.

There are four major categories of traditional marriage arrangements that we have identified: *tongyangxi*, normal marriage, wife purchase, and widow remarrying. Because a *tongyangxi* (Child Bride) is very young, any ceremony involved is relatively simple. A *tongyangxi* is a girl that is transferred to the to-be-husband's household. The marriage takes place (and is "complete") when the husband comes of age. In a widow's remarriage, because a married woman belongs to the marital family, for a widow to remarry, her father-in-law or the master of that household needs to preside over the ceremony to validate it, and this also means that the marital family has to decide on bride-price and other dowries, and will be the sole receiver (benefiter) of those. There are places where the widow's natal family needs to be notified and gets involved in the negotiation of bride-price and dowries, and will be the receiver of some portions of those (Guo, 2001, 2010).

For every marriage, we first record two prices: the agreed price and the actual price paid for the bride. The recorded price (in official mint currency) is converted into taels of silver based on historical conversion charts.¹¹ Then, we take the bigger value between the agreed and actual paid price. From this we obtain a basic tabulation of bride-prices, shown in Table 1. The table shows that the average bride-price of all samples is 19 taels of silver while the maximum among samples is 442 and a half taels. The average bride-price for individual categories are as follows: for a wife it is 18.1 taels; for a concubine, 31.6 taels, and for *tongyangxi*, 7.4 taels. These averages in accordance with estimates calculated by other historians (Wang, 2000). Because a *tongyangxi* is usually very young, which means that the groom's family will pay a substantial amount of expenses to raise her, her price is the lowest of all

¹¹ For conversion charts, see Peng kaixiang (2006). *Qingdaiyilaideliangjia: lishixuedejieshi yu jaijieshi* (清代以來的糧價：歷史學的解釋與再解釋 Food prices since the Qing: an interpretation and re-interpretation from a historiographic point of view). Shanghai: Shanghai renmin chubanshe (上海人民出版社). This book provides conversions in Jiangnan (江南 "South of the Yangtze river") and Huabei (華北 "North China", north of the Yangtze) regions. In our conversion, we use Jiangnan price for Anhui (安徽), Jiangsu (江蘇), Zhejiang (浙江), Fujian (福建), Jiangxi (江西), Hunan (湖南), Hubei (湖北), Sichuan (四川), Yunnan (雲南), Guizhou (貴州), Guangdong (廣東) and Guangxi (廣西) provinces. For Fengtian (奉天, Liaoning 遼寧), Zhili (直隸, Hebei 河北), Henan (河南), Shandong (山東), Shanxi (山西), Shaanxi (陝西) and Gansu (甘肅), we use Huabei prices. For the unit is dongqian (東錢), the conversion to official mint currency used is 25 to 4. For jingqian (京錢), it is 2 to 1. Loss monies (折錢) takes their according discount (0.7, 0.8 or 0.9, etc.) in their conversion to official mint currency. Afterwards they are converted into silver using conversion rates in the above. For fanyin (番銀 foreign currencies), the direct conversion into taels of silver follows the rate 1 to 0.73.

categories. However, why the average cost of a wife is 13.5 taels lower than a concubine? One reason may be that because a concubine is intrinsically unnecessary, the criteria of her selection become focused on appearance and other superfluous qualities. Another, more important, reason is that a wife ranks higher in status than a concubine, so she enjoys more power and privileges in her marital home; this includes the fact that children born from the concubine would first of all belong to their father, followed by the wife before the concubine, despite that the latter was the biological mother. Precisely because a concubine would have a lot of potential sacrifices to make in status and power in her future, the groom's family had to make compensations during negotiations of her acquirement. This compensation could roughly be equated to the difference of 13.5 taels of silver. In other words, a woman between the choice of being a wife and concubine faced this dilemma: if she was to become a concubine she would ask for 31.6 taels of silver to be paid to her natal family. If she instead became a wife, then her parents would accept 13.5 taels less, equaling the extra status and power that she would gain in her marital family.

We also compute bride-prices corresponding to the three types of marriages: normal marriages, wife purchases, and widow remarriages. Here, for convenience, we have classified the 79 cases of *tongyanxi*(Child Bride) as normal marriages as well. The wife purchases category includes those prices from scenarios where greed has prompted the transaction, i.e., kidnapping and holding a woman ransom, selling or buying a wife for divorce, parents-in-law being forced to sell their daughter-in-law after their son's departure from home (e.g. for work) and their financial situation has come under pressure.¹² These scenarios most represent how women have become a form of insurance, and their values are most sensitive to any risk events, so they are the focus of our analysis.

According to Table 1, the average price for bride in a regular marriage is 15.4 taels of silver, whereas the average price of a married woman (wife or concubine) or a widow is 19.6 taels and 20.3 taels respectively. The fact that the latter two have greater prices than the former is difficult to understand at first glance.¹³ If we look at the three types of marriages once more, this time in terms of age, we see that the average age of the bride in a regular marriage is 15.5 years. For wife purchase, it is 27.4, and 32.5 for a remarrying widow. The medians are 15, 26 and 32 for the three cases respectively.¹⁴ Therefore, from an age's point of view, wives and widows that are bought are in general older than those marrying normally. However, the older the women, the higher their bride-prices will be. This seems even more perplexing. Of course, the average age of a remarrying widow and a woman who is already in a marriage is higher than the average age of those women marrying for the first time, as the case should be. As a result, the

¹² Because it was customary for marriages to evolve around profit making, women were valuable assets and were often targets of kidnapping for ransom especially during a natural hazard. In our data, most kidnappings occurred because a wife had had an argument with her husband, or could not tolerate her husband's poverty, which then made her vulnerable to kidnappers. Because of the nature of these cases, we group them with other cases that involve the selling of a wife.

¹³ Non-monetary gifts besides bride-price in a regular first marriage might involve more values than in a wife sale or a widow remarriage. These gifts had more components (e.g., dowries) and more calculative decision-making, and are often difficult to trace on legal records. However, even though in a regular marriage a groom might offer more gifts, a bride would in turn bring more with her over to her marital household. These would essentially offset each other, hence only influencing our results minimally.

¹⁴ The basis of the average age is all cases that contain records of age. Age is calculated as such: *age of the bride* = *age at the time the case was reported* – (*year the case was reported* – *year of transaction of bride*). The numbers of cases that contain age information are: 263 regular marriages, 745 wife purchases and 413 widow remarriages respectively.

question remains why would the price for a widow be the highest among all types of available women, and purchasing a wife should cost more than buying an unmarried woman? Purchasing a wife or a concubine is very similar to purchasing a widow but all these are different than buying an unmarried woman. The first reason is that a widow, wife and concubine have all been married already. The second reason is that “regardless of how her bride-price is to be arranged and used, [...], the widow herself has become the commodity” (Guo 2010). The sales of both wives and concubines are also a purely financial exchange. The third reason is that when a wife is sold, the officiator is her husband, while in the case of a widow it is her father-in-law or a member of her marital family.¹⁵ In both of these arrangements the officiator is someone looking to maximize profits from the sale. In the case of a daughter first sold for marriage, however, her parents are in charge of the marriage, and because they are the biological parents they may not be entirely driven by monetary gains. Perhaps there exist other emotional reasons as the cause for the marriage, resulting in a lack of intention to maximize profits from the sale. From the groom’s family’s point of view, whatever is paid for the wife is negotiated based on her future ability to provide services to justify her costs. The higher the price, the more the bride may be made to do in her marital family, and she may pay for it in a loss of status as well as being treated worse in her new home. Precisely because of this difference in who acts as the officiator, when a wife is sold or when a widow remarries, her price is higher than that of a woman marrying for the first time, and this difference roughly equals what the latter’s parents are willing to “pay” as an “emotional premium”.

To keep things simple, the rest of this paper uses “bride-price” to indicate the price paid for a woman in marriage, whether it is a normal marriage, the purchase of a married wife or a widow, unless otherwise specified.

Table 1: Basic bride-prices

	Full sample	Post-transaction status			Mode of transaction		
		Wife	Concubine	<i>Tongyangxi</i> (Child Bride)	Normal marriage	Wife or concubine selling	Widow remarriage
	19.0	18.1	31.6	7.4	15.4	19.6	20.3
Average	[12] (23.8)	[12] (20.6)	[20] (44.2)	[6] (6.7)	[8.8] (19.6)	[12.4] (26.8)	[14.4] (20.9)
Minimum	0	0	0	0	0	0	0
Maximum	442.5	343.5	442.5	37.1	220	442.5	170.9
Sample size	3119	2763	274	79	641	1517	961

¹⁵ Remarriages of widows in the Qing showed these distinct patterns: One, chastity among widows was encouraged both by the government and among the common people. The law and traditional culture alike gave widows some rights to decide their own future. Even though the decision to marry away a widowed daughter-in-law was ultimately held by her father-in-law (her husband's family), whether she agreed to the remarriage was still an important decision. In Qing law, forcing a widowed daughter-in-law for remarriage was punishable by caning (Guo 2009). Two, had the widow mothered children with her late husband, she would have received control over family properties. Even in the case that she was childless, Qing law allowed her the right to inherit her late husband's claim to family assets (Bai 2003). Precisely because of these arrangements, in a remarriage of a widow it often occurred that invitations were sent out for men to sell themselves as her husband (招夫養子, 坐產招夫, 招贅 or 招夫). Three, because a place where a lot of widows remained chaste would be officially recognized, municipal officials and prominent families encouraged chastity in places within their jurisdiction. This resulted in the emergence of *Qingjietang* (清節堂 Chastity hall), *Xulihui* (恤嫠會 Widow relief society) and similar charitable organizations for widows (Guo 2001). All of these complicated marriages for widows.

Remarks: Samples include zero bride-price. Unit: taels of silver. Numbers in square brackets [] are medians. Numbers in parentheses denote standard deviations. Bride-prices include prices in regular marriages, purchases of already married women and widows. These apply to all follow tables.

Grain price data used to measure risks of natural hazards come from Qing Dynasty's official records. Since the beginning of Qianlong's reign (1736), Qing had a strict system for reporting food prices to the emperor. Every prefecture accordingly reported to the provincial government prices of five main staple foods within its region. Then the governor sorted the highest and lowest prices of each prefecture and reported them to the central government. We obtain data from 1736 to 1911 from the "Qing-era Grain price Database" of the Institute of Modern History (Academia Sinica, Taiwan). Food prices of wheat-producing regions from the data are wheat prices; those from rice-producing regions are mid-grade rice prices.¹⁶ The average grain price, nonetheless, among all provinces, regardless of the type of grain, is roughly 2 taels of silver for every stone.

We can compare bride-prices with income and food prices. According to Wang (2000) and the income-related data we have collected from the Qing legal records, those employed in a farming village earned between 3 to 5 taels of silver. If we suppose the income was 5 taels of silver for two years, an employed worker would need about 4 years before he could afford a wife. His wage per year was roughly 2.5 stones of rice or wheat (assuming that every stone of either grain cost 2 taels of silver). An adult would consume about 2 stones of food in a year,¹⁷ which would equal about the income of 0.8 years. Selling a daughter, therefore, could provide food for a four-member household for a year, and selling a wife or a widow could feed a household of five for a year. From this we can see that sales of wives at the time could lead to a sizable income, which would be relatively useful when facing a natural hazard. For example, considering a certain famine lasted for half a year, then this could in fact achieve "selling one for the survival of ten".

Figure 1 shows three indicators: **the number of wife purchases** (summing all cases of wife purchases across the country in a given year), **bride-price** (average of all money paid for a woman for marriage across the country in a given year), and **grain price** (average of all grain prices from across the country in a given year). The figure shows that between 1737 and 1894,¹⁸ there were large fluctuations in bride-prices. Around the second quarter of Qianlong's (乾隆) reign they were relatively high, but dropped drastically in the third quarter. Prices went up as Jiaqing (嘉慶) became emperor. From the eve of the Opium War to during the Taiping Rebellion (太平天國運動), bride-prices continued to decline, but as the Taiping Rebellion drew to a close, prices began to increase. The average

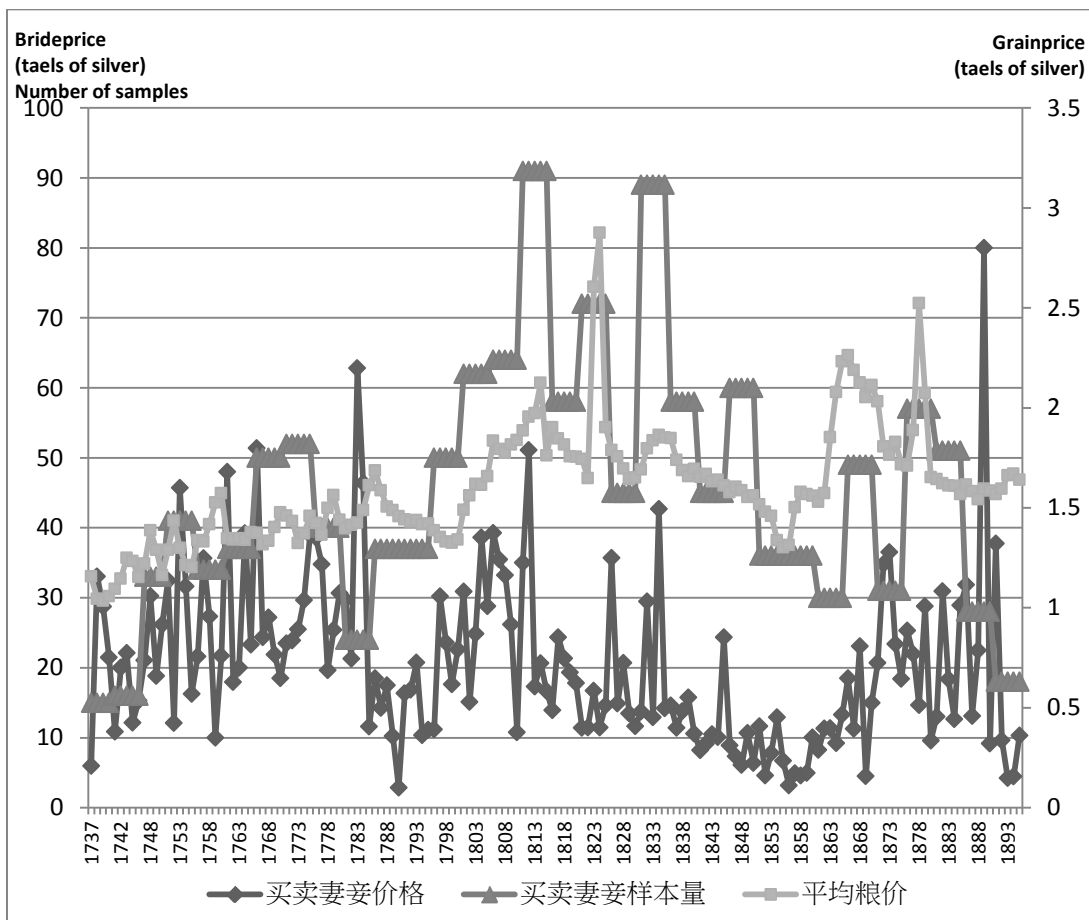
¹⁶ There were 19 provinces during the Qing dynasty. Among them, in Hunan (湖南), Guizhou (貴州), Guangdong (廣東), Guangxi (廣西), Hubei (湖北), Fujian (福建) and Anhui (安徽) grain price is in fact mid-grade rice price. For Zhili (直隸, Hebei 河北), Fengtian (奉天, Liaoning 遼寧), Shandong (山東), Shanxi (山西), Gansu (甘肅), Shaanxi (陝西), Sichuan (四川), Yunnan (雲南), Henan (河南), Jiangxi (江西), Zhejiang (浙江) and Jiangsu (江蘇), wheat price is used.

¹⁷ Before 1949 in China, the average rice consumption per capita was 37.5 catties per month, 450 catties per year. 1 stone of rice weighed roughly 100 catties, so for basic subsistence, 2 stones would feed a person through the year. See Wu (1988) for details.

¹⁸ There were no wife purchase-related homicides from 1736, 1895 or 1896.

grain price of the country and prices for wives had an inverse relationship. For example around 1822 there was a large period of time that saw a rise in food prices. At the same time wife prices plunged to an all-time low. The correlation between the two was -12%. The volume of women transaction and food prices, on the other hand, were proportional to each other, which would support our hypothesis that women were used as an insurance tool. Because natural hazards are usually geographically localized, their impact on food prices and on activities involving buying or selling wives must also be geographically localized. (In the past, transportation was strongly restrictive, further causing natural hazards to be localized.) For example a drought in Hunan would not mean that Shanxi and Shandong were also experiencing droughts. However, when we look at the average food price and wife price across the country, much of the impact coming from natural hazards has been absorbed. Because Qing food prices used the prefecture level as denominator, the following regression analysis on correlation between grain price and bride-price will also use the same denominator.

Figure 1: National grain price and brideprice, and number of wife purchases (1737-1895)



In order to obtain bride-price at the prefecture level, we average bride-prices from all cases collected in each

prefecture from each year, that is, $wcprice_{it} = \frac{\sum_j wcprice_{ijt}}{n_{it}}$, where i refers to the i -th prefecture and t refers to

the t -th year when the purchase took place; j specifies a particular sample case, and n_{it} is the number of wife-purchase-related cases collected during the t -th year from the i -th prefecture. $wcprice_{it}$ represents the average bride-price for the i -th prefecture during the t -th year. If the bride-prices observed from the legal cases were random, and these prices fluctuated around a certain average, then the above averages accurately reflect the equilibrium bride-price from every prefecture of each year.¹⁹

Among our sampled data, cases where a singular bride-price cost over 300 taels happened only three times—twice in Hebei, once in Hunan. If we do not discard these three cases as outliers, they will unfavorably distort the average price in the corresponding provinces. In addition, after we have averaged yearly wife prices, we discover some zeros among those averages. We discard any averages that equal zero or is greater than 300 in the end, considering them abnormalities.

According to data computed from all prefectures of the country, the price paid for a married woman and grain price have a correlation of -2%. Adding samples of widows changes that correlation to -0.6%. If normal marriages are considered as well, the correlation becomes positive, and is 0.1%. This simple correlation does not reflect the true nature of the relationship between bride-price and grain price because it is influenced by many other factors (such as time factor and geographical factor).

We therefore introduce a dummy variable to the linear regression performed on bride-price and grain price and by extracting the residual differences, eliminate in the data set heterogeneity due to differences between the prefectures where the samples were obtained. Using the residuals obtained from this regression we compute partial correlation coefficients to be -15%, -10% and -6% respectively. All three coefficients indicate that bride-price and grain price have a negative correlation, but the negativity decreases as more samples are considered.

This shows that bride-prices are indeed sensitive to food prices. In other words, they are sensitive to threats against survival. The average cost of a wife decreases most prominently after a rise in food prices. This is to say, it falls as survival faces more risks. On the other hand, because the remarriage of a widow and a normal marriage are both initiated by the bride's current family, they are less responsive to risks that threaten survival.²⁰

¹⁹ Because the key interpretative variable (grain price) and other control variables in the rest of this paper contain municipal-level data, the regressions constructed based on the framework of these variables are in fact an estimated regression on their classified averages. The results are identical to those obtained from their non-averaged counterparts. For the proof of this, see Angrist and Pischke (2009).

²⁰ The simple correlation coefficients between regular marriages and grain price and widow remarriages and grain price are 2% and 2% respectively. Removing municipal-level heterogeneity changes their coefficients to -1% and -0.6% respectively.

Besides grain price at the prefecture level, there are other bride-price- and grain price-related variables to consider. They can address what merely examining simple correlations may overlook, allowing the identification of how food prices (i.e., survival risks) impact prices of women. These other variables can roughly be classified into two groups:

1. Variables related to cultural or religious impact: Confucian culture and religion have very deep effects on the development of community within a society. For example in a region where there is a strong Confucian influence, families and lineages in that region have tighter, stronger bonds. When faced with natural hazards, as a result, the families and lineages tend to have more capacity to share resources as well as needs, lowering the need to sell women for marriage. Kung and Ma (2013) have also discovered that Confucianism reduces the tendency for farmers to cause a riot when faced with natural hazards. We make use of the number of Confucian temples, the number of chaste women on official records (which reflects a particular region's level of emphasis on chastity among women), or the number of schools and academies to evaluate the degree of Confucian influence in a place, and we evaluate all prefecture regions across the country. For convenience of comparing with influences from Buddhism and Taoism, we also use data on the number of Buddhist and Taoist temples.²¹ These figures come from *Daqingyitongzhi* (大清一統志) compiled during the Kangxi (康熙), Qianlong (乾隆) and Jiaqing (嘉慶) eras. Because only data from these three eras are available, we align our study with the times that the *Daqingyitongzhi* was updated, so our data have been sorted as follows: the “year 1764 or before” group comes from the Kangxi part of the *Daqingyitongzhi*; “1764-1820” belongs to the Qianlong section of the *Daqingyitongzhi*, and “1820 and after”, the Jiaqing part of the *Daqingyitongzhi*.

2. Socio-economic variables: These variables include population of each prefecture (in tens of thousands of people), population density (in hundreds of people per squared kilometer), number of homicides caused by land-related conflict and debt related matters (number of cases in the legal records in a given year per one hundred thousand people), number of homicides caused by marriage and adultery-related matters (number of cases in the legal records in a given year per one hundred thousand people). Because these socio-economic variables have potential impact on food production and therefore costs, affecting prices of women, they help address the problem of distortions due to over-simplification. Data on prefecture populations come from Cao's estimates on the Qing dynasty (Cao, 2001, pp 691-718). Any missing values have been inserted using linear interpolation. Data on land areas come from a 1820 record of land division in the country. Data on homicides due to land-related debts and adultery come from the criminal reports, and have been computed as homicidal rates with the above data on populations (Chen, Peng, Zhu 2013). The major variables are listed in Table 2.

²¹ In order to distinguish more clearly the influence from Confucianism and Buddhism, we interpret all “ancestral temples” (祠廟) in *Daqingyitongzhi* (一統志) as “Confucian temples” and “monastic temples” (寺廟) as Buddhist temples. The number of chaste women in a prefecture is in hundreds of people. Other units are singular.

Table 2: The major statistical variables

Variables	Descriptions	Average	Median	Standard Deviation
Bride-price	wcprice: the price for a bride. Units: taels of silver	19.3	12.9	24.0
Grain price	grain price: price of rice or wheat. Units: taels of silver	1.66	1.52	0.65
# of Confucian temples	The number of Confucian temples in a prefecture	13.8	11	11.4
# of schools	The number of schools and academies in a prefecture	8.3	8	4.0
# of chaste women on record	The number of chaste women on official record in a prefecture (in hundreds of people)	2.86	1.31	4.90
# of Buddhist temples	The number of Buddhist temples in a prefecture	9.8	8	10.2
# of Taoist temples	The number of Taoist temples in a prefecture	3.4	2	3.2
Population density	The average number of people residing in 1km ² in a prefecture	1.41	1.10	1.27
Population size	The number of people residing in a prefecture (in ten thousands of people)	185.5	149.6	131.1
Land-related homicide rate	The number of homicides due to land-related debts in a prefecture per one hundred thousand people	0.2	0.1	0.3
Marriage, adultery-related homicide rate	The number of homicides due to marriage- and adultery-related cases in a prefecture per one hundred thousand people	0.3	0.2	0.4

2. Natural Disasters, Grain price, and Bride-price

What this paper concerns is the “women as insurance assets” hypothesis, and the key to drawing that conclusion lies in whether there is liquidity of the women in a family that faces risks from natural risk events. Such risk events include droughts, floods, earthquakes, epidemics, locusts and other pests. Other hazards include non-natural events such as war. These events ultimately threaten lives through food shortage, which is why we have chosen grain price to collectively reflect the existence of these risk events, as opposed to directly looking at individual types of risk events such as drought and flood.

Clearly, even though numerous factors can lead to fluctuations in food prices (which, in some ways, is the advantage of using this variable), we still hope to demonstrate and verify the notion that when an external risk event (e.g., a drought or a flood) strikes, food prices will rise. If in reality that is the case, our choice of using food prices as a proxy for events of risks is indeed appropriate. Because of this, we use climate as a parameter for our verification. In an agrarian society that very much depends on climate and weather, rainfall is an important agricultural input. Overly dry or wet weather can easily lead to reductions in harvests, leading to food crises and threatening human survival. Whether it rains or not is an external challenge as opposed to being generated from within the society (i.e., whether it rains or not does not depend on whether the custom of children purchase exists). This is to say, because we are about to use variations in food prices (the occurrence of a risk event) to explain fluctuations in prices of wives, we want to be able to say that food prices is an independent variable and prices of women are the dependent variable, but not vice versa, restricting this function to being a single-directional one.

The Chinese Academy of Sciences and Peking University, together with the China Meteorological Administration

(CMA) and other institutions, have collected data into the *Zhongguo jin 500 nian hanlao dengji fengbu* (distribution of wetness and dryness levels in China in the recent 500 years 中國近 500 年旱澇等級分布). The data were collected in two stages from 118 collecting stations across the country between the years 1470 and 2008. The data were then grouped into 5 levels of dryness and wetness, 1 being very wet (i.e., a flood season) and 5 being very dry (exceptional drought). After we have mapped all stations by their latitudinal and longitudinal coordinates and performed linear interpolation in places where a station has been absent, we obtain a map of rainfall (in terms of the five levels of wetness mentioned above) of all prefectures across the country. From that, we obtain data for 1736 to 1896 as required.

In Table 3, we divide the degree of dryness or wetness of a year in all prefectures and all years into 5 groups. Then we calculate food prices and bride-prices pertaining to each group. This of course has not taken into consideration the differences between different prefectures and years. It is simply a rough, estimated average. This table shows that, food prices in a normal year are lowest, and they rise during a dry or a wet year. Especially when there is a drought, food prices are at their highest. This shows that a drought has the most impact on human survival. A flood has significant impact on human survival as well, but may not lead to a decline in food production as much as a drought does. This illustrates that food prices can indeed reflect the degree of impact brought by a natural disaster, and this is consistent with Parenti's study (1942).

Whether it is based on samples from a wet year, a relatively wet year, or a relatively dry year, the price of a bride is roughly identical to that of a normal year, at about 20 taels of silver. The price is slightly higher in the relatively dry year (than in the relatively wet year). Only during a drought year does the price become lowest, dropping to below 18 taels, 2 taels below the average. The median prices show that women tend to sell for the most money during a relatively dry or relatively wet year, but cost the least during a drought year. This indicates that a drought tends to decimate food production more than a flood, and a drought leads to substantial increases in food prices and crisis against survival, prompting more families to sell wives and daughters (Pan, 2010). This in turn leads to an over-supply of women on the market, and a drop in their price. In years where there have been widespread droughts, even open human markets have emerged, as can be found in Zhao's study (2008). Our large sample of data also confirms what historical literature has described. For example, "during Guangxu's (光緒) reign, droughts in northern China caused a decrease in the value of women" (Zhao, 2008). In the fourth year of that era, in Tongzhou (同州), Shaanxi province (陝西), women were sold at 100 to 200 *qian* (錢, mace), which was 10% to 20% of a tael ("賣婦女有一二百錢者,有一二易之者").²² This phenomenon matches what Goldschmidt (1974) discovered in 1974 in Africa—women prices decreased during a natural hazard.

²² Rao yingqi (饒應祺), *Tongzhoufu xuzhi* (同州府續志), published during the seventh year of Guangxu (光緒).

Table 3: Climate-dependent grain prices and bride-prices (prices in *taels of silver*; numbers in parentheses denote medians)

Wetness/dryness	Flood	Mild flood	Normal	Mild drought	Drought
Wetness/dryness level	1	2	3	4	5
Grain price	1.75 [1.70]	1.68 [1.55]	1.55 [1.43]	1.80 [1.68]	1.93 [1.70]
Average price of wives and concubines only	20.9 [13.5]	19.5 [14.8]	20.2 [13.9]	22.3 [15.8]	17.5 [12.4]
Average price of wives, concubines and widows	20.4 [13.5]	21.0 [16.1]	20.9 [15.0]	23.5 [16.3]	17.2 [10.9]
Average bride-price (over entire sample)	19.7 [13.5]	20.6 [15.6]	20.0 [13.8]	21.9 [15.8]	17.8 [11.1]

In order to further analyze how a drought year differs from other years, we have specially separated those drought years into a group, and everything else into another group. Then we compute averages of grain prices and women prices. The results are listed in Table 4. The observation regarding sales of wives is that, on average, prices in a drought year are 2.1 taels of silver lower than those in a non-drought year. Regarding sales of both wives and widows, the difference is 3.8 taels, the average for drought years once again being lower than for non-drought years. If all samples are taken into consideration, then the average from drought years is 2.6 taels of silver lower than the average from non-drought years. In terms of grain prices, the corresponding numbers from the drought-years group are 0.35 taels, 0.35 taels and 0.29 taels more than those from the non-drought-years group. Therefore, a drought causes food prices to be about 20% higher than on average (of normal years), and it causes women prices to drop about 14% from the average of normal years.

This shows that a drought has the most impact on agrarian societies. This is consistent with the conclusions drawn by Bai and Kung (2011) and Jia (2013). They have discovered that in ancient China, drought had the highest potential to lead to violence.

What this section describes mainly comes from single-variable variations without having a lot of other control factors being fixed and held constant. Therefore, the following will take a more rigorous quantitative approach to analyzing and verifying the impact of food prices on prices on the women market, in order to confirm the “women as insurance assets” hypothesis.

Table 4: The effects of drought on grain prices and bride-prices

		Non-drought years	Drought years	Difference
Wife-sale sample only	Grain price	1.70 [1.58]	2.04 [1.74]	0.34
	Average price of wives	20.6 [14.6]	17.6 [12.4]	-3.0
	# of samples	969	74	
Samples of wife-sales and widows	Grain price	1.66 [1.53]	2.00 [1.72]	0.34
	Average price of wives and widows	21.2 [15.3]	17.3 [11.1]	-3.9
	# of samples	1583	101	
All samples	Grain price	1.64 [1.52]	1.93 [1.70]	0.29
	Bride-price	20.4 [14.7]	17.8 [11.1]	-2.6
	# of samples	1948	129	

Remarks: Prices are in *taels of silver*. Numbers in square brackets [] are *medians*. “Non-drought years” include wet, relatively wet, normal and relatively dry years.

IV. Quantitative Analysis, Empirical Results and Interpretation

According to the hypothesis mentioned above we derive this statistical regression formula:

$$wcprice_{it} = \alpha + \beta grainprice_{it} + \gamma X_{it} + \eta_i + \theta_t + \varepsilon_{it},$$

where $wcprice_{it}$ is the bride-price pertaining to a prefecture, $grainprice_{it}$ is the average grain price of that prefecture. We expect β to be a negative value, i.e., an increase in grain price will lead to a decrease in bride-price.

η_i represents heterogeneity for the i -th prefecture, and θ_t represents heterogeneity in the t -th year. X represents other variables pertaining to that prefecture: the number of Confucian temples, schools, chaste women on record, Buddhist and Taoist temples, and population, population density, land debt-related homicide rate, and marriage- and adultery-related homicide rate.

1. Standard linear regression and other comparisons

We begin by performing linear regression on the entire sample and using that as the standard. We then gradually eliminate samples that represent normal marriages, remarriages of widows and so on until what remains in the samples are the prices of wives and concubines. This allows comparisons of samples from the three types of marriages and how each responds to risks events and gives a better idea of the validity of our hypothesis.

Tables 5 and 6 contain the results of the standard linear regression over the entire set of prefecture-level data. Considering the heteroskedasticity in bride-prices among different prefectures, we provide a White's heteroscedasticity-consistent robust t-statistic for each correlation coefficient's point estimate. The first column in Table 5 is the coefficient of the single-variable regression between grain price and bride-price in the absence of other control variables. The coefficient is positive but only slightly so. This echoes our earlier result: a positive weak correlation between grain price and bride-price. In the second column, effects from individual prefectures have been fixed (variations between specific prefectures eliminated). The result is that for every tael (of silver) of rise in grain price there is a 2.17-tael drop in bride-price, with a 5% statistical significance. This agrees with expectations from our hypothesis: a rise in grain price reflects a shortage in food supply, indicating a higher risk in survival, which causes bride-price to fall. This column also shows that differences between prefectures have a huge impact on estimating the effect of food prices on women prices. In the third column, time has also been normalized (the year-to-year difference is eliminated), and grain price is discovered to have an even larger negative impact on bride-price: here every rise of 1 tael of silver for a stone of food results in a drop of 3.62 taels for a bride, with a 1% statistical significance. This indicates that time patterns also affects the negative correlation between grain price and bride-price. In all following regressions we have normalized both prefecture-to-prefecture and year-to-year effects.

The fact that grain price and bride-price have a negative correlation clearly has not come from inflation. Neither is it a result of prefecture income growth, because these two should lead to parallel rises and drops between grain price and bride-price, as opposed to the reverse.

A study by Kung and Ma (2013) shows that Confucianism has tremendous impact on a traditional Chinese society. For example, it reduces the possibility that farmers resort to violence and cause a riot during a famine. Families during the Qing dynasty, as both a producer and dealer of risks, are managed according to implicit Confucian principles. Where Confucianism is more deep-rooted in a particular area (ties between family and extended families are stronger), the need to sell wives during a crisis must decrease. Bride-prices should be high consequently. Hence, we use two indicators to measure the impact of Confucian culture: The number of Confucian temples and the number of chaste women in a community on official record. We first look at the effects of the number of Confucian temples on bride-price: Column 4 shows that, on the basis that food supply has the same effect on the value of women, the number of Confucian temples have little effect on bride-price. In column 5, the number of Confucian temples has been replaced by the number of schools in the prefecture, and the result shows that that has a positive correlation with bride-price, but its effect is not strong either. In the following column (column 6), the number of chaste women has replaced the number of schools. The effect of grain price on bride-price is unaffected, but the number of chaste women has a positive correlation with bride-price and the statistical significance is at 5%. This suggests that where there are more chaste women, it costs more to gain a bride. This indicates that where chastity was prominent in a prefecture, there were less dealings of widows and married women. The results are that there would be less supply of them on the market, driving their price higher. As with a description by Guo (2001), throughout Chinese history there were efforts to restrain women, but especially beginning in the Shunzhi (順治) era there was a policy to honour chastity, there was strengthening of such a culture and value system. Our analysis makes it clear that one of the consequences of this policy was that women became increasingly unaffordable for men.

With a lot of parallels with Confucianism are Buddhism and Taoism. Columns 7, 8 and 9 correspond to columns 4, 5 and 6, but with the addition of the number of Buddhist and Taoist temples. With the effects from Confucian, Buddhist and Taoist cultures normalized, the effect of grain price on bride-price remains at -3.62 with a statistical significance of 1%. The addition of Buddhist and Taoist influence as a variable changes column 4's point estimation from negative to positive, while there is no difference for the correlations between the number of schools and bride-price, and the number of chaste women and bride-price (difference between column 5 and column 8, and between columns 6 and 9). This shows that leaving out Buddhist and Taoist temples produces a large discrepancy in the correlation between the number of Confucian temples and bride-price. In column 7, the number of Buddhist temples has a negative and clear effect on the price of women. This may be explained as follows: where there is a significant influence of Buddhism, there may be fewer obstacles in purchasing a wife. If that leads to a higher supply of women on the market, their prices will fall.

Table 5: Regression results: controlling cultural and religious variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	wcprice	wcprice	wcprice	wcprice	wcprice	wcprice	wcprice	wcprice	wcprice	wcprice
Grain price	0.02	-2.17**	-3.62***	-3.62***	-3.64***	-3.61***	-3.62***	-3.64***	-3.61***	-3.61***
	(0.03)	(-2.30)	(-3.34)	(-3.34)	(-3.34)	(-3.30)	(-3.34)	(-3.34)	(-3.30)	(-3.30)
# of Confucian temples				-0.46			1.87			1.35
				(-0.29)			(0.96)			(0.65)
# of schools					0.50			0.50		-0.02
					(0.59)			(0.59)		(-0.03)
# of chaste women on record						0.54**			0.54**	0.54**
						(2.22)			(2.22)	(2.35)
# of Buddhist temples							-3.48*	30.93	17.55	-2.92
							(-1.94)	(1.04)	(0.63)	(-1.21)
# of Taoist temples							-2.96	-112.0	-65.74	-2.79
							(-1.28)	(-1.16)	(-0.74)	(-1.19)
Prefecture fixed effects	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year fixed effects	N	N	Y	Y	Y	Y	Y	Y	Y	Y
<i>N</i>	2086	2086	2086	2086	2071	2055	2086	2071	2055	2055
<i>R</i> ²	0.000	0.242	0.363	0.363	0.365	0.368	0.363	0.365	0.368	0.368

Remark: Heteroskedasticity-robust t statistic values are enclosed in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

The estimates for the influence of the number of Taoist temples is negative, but weakly so. In columns 8 and 9, the coefficients pertaining to the number of Buddhist temples and the number of Taoist temples are irregular, further indicating that disregarding the effect of the number of Confucian temples will cause discrepancies in the other two. As a result, in column 10 we control all five culture-related variables. The result is that grain price's correlation with bride-price remains at -3.61 with a 1% statistical significance. Among the five controlled variables, only the number of chaste women on official record has a prominent coefficient, which remains unchanged at 0.54. The numbers of Confucian temples, schools, Buddhist temples and Taoist temples all have non-significant effects. Except the number of chaste women, the other four variables may have a strong collinearity. We require further control of explanatory variables in order to confirm the validity of this conclusion.

Clearly, variations in socio-economy pertaining to a geographical location not only affect food prices but also financial activities (including insurance) involving transactions of women. As a result, we have added to Table 6 a controlled variable in socio-economics. The first column in this table builds upon the basis of column 3 in Table 5, with the addition of two variables, population density and population size. This results in a slight increase in the correlation between grain price and bride-price, with a statistical significance at 1%. Of the new variables added to the consideration, population density has a negative effect on bride-price throughout. This means that the higher the population density of a place, the higher the pressure on everyday life, so there may be a rise in activities to buy and sell wives. However, this relationship is not pronounced. Population size has, on the other hand, a positive effect on bride-price, which means that in a place where there is a larger population, there will be more men in requirement of a wife. In other words there is a higher demand to drive up the price of women, but once again, this relationship is not pronounced. Also added to column 2 are the homicide rate due to land-related debts and homicide rate due to marriage and adultery. Their additions cause the coefficient between grain price and bride-price to rise (in magnitude) to -3.73 with a statistical significance at 1%. Meanwhile, effects from other variables are not much affected. Here, the correlation between the rate of land debt-related homicides and bride-price is slightly positive. The correlation related to the rate of adultery-related homicides is negative, but only slightly so.

Columns 3 to 6 in Table 6 correspond to columns 7 to 10 in Table 5 with the addition of the variables population density, size of population, the rate of land debt-related homicides and the rate of adultery-related homicides. When these socio-economic variables are controlled, the number of chaste women in a prefecture has stronger effect on bride-price as its coefficient jumps from 0.54 to 0.70. This is to say that for every 100 women that get recognized for chastity, the price of women in that prefecture rises by 0.7 taels of silver, which is a more noticeable rise. The results here show that neglecting both land debt-related homicide rate and marriage or extra-marital affair-related homicide rate has some influence on the effect of the number of chaste women on official record in a prefecture on the price of women there. Other variables' coefficients show smaller changes; they are largely similar to previous values.

Regressions in Tables 5 and 6 show that grain price indeed have a negative impact on bride-price. In fact the impact is precise and clear. This is to say, according to the large amount of data from the Qing we have collected, risk

events characterizable by food prices will lead to a drop in bride-price. This supports the notion that “women were used for insurance” and parallels Goldschmidt et al’s observations (1974) on bride-prices in Africa, and Pan’s study (2010). The next variable that shows significant influence on bride-price is the number of chaste women in a prefecture, and the influence is very positive. This number represents the amount of emphasis placed on chastity among women. The more restraint is placed on women, the less they are willing to be sold for marriage. This is especially true in the case of widows (for remarriage). The result is a decline in women supply, which drives up their prices on the market.

The number of Confucian temples, which measures the depth of Confucian influence, has a positive effect on bride-price, but the effect is not pronounced. On the other hand, the number of Buddhist temples has a negative correlation with a 5% statistical significance. Meanwhile, the negative correlation between the number of Taoist temples and bride-price is not significant. The fact that the result shows a small effect the number of Confucian temples has on bride-price seems to contradict the conclusion drawn by Kung and Ma (2013). What they have discovered is that Confucianism, represented by the number of Confucian temples and schools, can very perceptibly lower the potential risks presented by natural hazards on farmers. Meanwhile, the number of chaste women, as they have discovered, is not significant. What this study has shown, on the other hand, is that the numbers of Confucian temples and schools have limited effects on bride-price, but the number of chaste women has a strong positive correlation. The results in this study regarding influence of Confucianism and chastity illuminates how they have influenced the Chinese society and its development.

Table 6: Regression results: controlling factors of socio-economic conditions

	(1)	(2)	(3)	(4)	(5)	(6)
	wcprice	wcprice	wcprice	wcprice	wcprice	wcprice
Grain price	-3.69*** (-3.34)	-3.73*** (-3.37)	-3.73*** (-3.37)	-3.76*** (-3.39)	-3.61*** (-3.26)	-3.61*** (-3.25)
# of Confucian temples			1.12 (0.50)			1.02 (0.45)
# of schools				0.48 (0.56)		-0.17 (-0.21)
# of chaste women					0.69** (2.52)	0.70*** (2.73)
# of Buddhist temples			-2.98 (-1.45)	19.78 (0.62)	14.96 (0.47)	-2.70 (-1.09)
# of Taoist temples			-2.37 (-1.02)	-75.53 (-0.73)	-57.60 (-0.57)	-2.23 (-0.94)
Population Density	-2.50 (-0.77)	-2.55 (-0.79)	-2.55 (-0.79)	-2.51 (-0.78)	-3.21 (-1.04)	-3.24 (-1.04)
Population Size	0.03 (0.97)	0.03 (0.98)	0.03 (0.98)	0.03 (0.97)	0.02 (0.76)	0.02 (0.77)
Land debt-related homicide rate		0.12 (0.06)	0.12 (0.06)	-0.16 (-0.08)	-0.30 (-0.15)	-0.30 (-0.15)
Marriage- and adultery-related homicide rate		-0.77 (-0.59)	-0.77 (-0.59)	-0.58 (-0.44)	-0.52 (-0.39)	-0.52 (-0.39)
Prefecture fixed effects	Y	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y	Y
<i>N</i>	2030	2028	2028	2014	1998	1998
<i>R</i> ²	0.367	0.366	0.366	0.369	0.373	0.373

Remark: Heteroskedasticity-robust t statistic values are enclosed in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

2. Regressions on samples of the purchase of married women and remarrying of widows

The previous section shows that normal marriages are rather different than widow remarrying and the purchasing of a wife, but the latter two are relatively similar. As a result, we discard all regular marriages (including *tongyangxi*) from our samples, leaving only the buying and selling of wives, and remarriages involving a widow in the sample set. Table 7 is based on the previous regressions done on wife purchases and widow remarriages: the first column of Table 7 corresponds to Table 5's second column, and columns 2 to 5 in Table 7 correspond to Table 6's columns 3 to 6. Using Table 7's column 5 as an example, after discarding normal marriages, grain price has a more negative effect on bride-price, going from -3.61 to -5.33, with a statistical significance at 1%. This shows that the purchase of a married woman and a widow are even more sensitive to risk events reflected by prices of staple food. On the other hand, the effect that grain prices have on normal marriages is lower. Also, regardless of what other variables have been added to the regression, the correlation between grain price and bride-price remains at around -5.33 throughout Table 7.

Under any other combination of control variables, there is a rise in both correlation coefficient and the value of t between the number of Confucian temples and the price of women, but statistically speaking, their values are not significant. Similarly, the number of schools has a positive but insignificant effect. The number of chaste women has a larger effect on bride-price now, among purchases of wives and widows, compared with its effect on the whole sample (including normal marriages). It has gone from 0.7 to 0.78 with a statistical significance at 5%. Because in recognizing chaste women, the emphasis is on chastity, so it clearly promotes and exemplifies the act of a widow choosing not to remarry. As widows are discouraged to find another husband, their supply on the market is reduced, and their prices rise accordingly. The effect of the number of Buddhist temples on bride-price is negative and is significant; that of the number of Taoist temples is negative but insignificant. The rate of homicides due to land-related debts has a positive but insignificant effect, while other economic variables have similar effects as before. Their coefficients (including their signs) agree with expectations.

Table 7: Regression results: wife selling and widow remarriage

	(1)	(2)	(3)	(4)	(5)
	wcprice	wcprice	wcprice	wcprice	wcprice
Grain price	-5.40***	-5.31***	-5.35***	-5.21***	-5.21***
	(-3.87)	(-3.76)	(-3.77)	(-3.69)	(-3.68)
# of Confucian temples		2.74			3.21
		(1.07)			(1.24)
# of schools			0.53		0.02
			(0.56)		(0.03)
# of chaste women				0.78**	0.78**
				(2.20)	(2.30)
# of Buddhist temples		-4.51*	44.19	42.84	-5.02*
		(-1.93)	(1.19)	(1.20)	(-1.80)
# of Taoist temples		-3.44	-156.8	-150.1	-3.51
		(-1.23)	(-1.31)	(-1.32)	(-1.24)
Population Density		-2.58	-2.57	-3.17	-3.17
		(-0.83)	(-0.83)	(-1.09)	(-1.09)
Population Size		0.001	0.0004	-0.010	-0.011
		(0.05)	(0.01)	(-0.41)	(-0.41)
Land debt-related homicide rate		0.92	0.57	0.48	0.48
		(0.43)	(0.26)	(0.21)	(0.21)
Marriage- and adultery-related homicide rate		-1.75	-1.50	-1.42	-1.42
		(-1.21)	(-1.04)	(-0.97)	(-0.97)
Prefecture fixed effects	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y
<i>N</i>	1689	1643	1631	1617	1617
<i>R</i> ²	0.445	0.445	0.446	0.450	0.450

Remark: Heteroskedasticity-robust t statistic values are enclosed in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

3. Regression based on the wife and concubine-selling sample

Compared with other forms of marriages, buying and selling wives most directly represent “using women for insurance”. This is much like what a monologue in “Erhuanji” says, “I’ve considered selling the maid, but, underage, she is worth not a mace. I’ve thought about selling the son, but am afraid he will be separated from his father once and forever. I’ll sell my daughter-in-law then, so I can survive the famine”. A daughter-in-law is most available when there is the need for insurance.

In the following, we further eliminate data on widow remarriages, leaving only samples of purchases of married women for a regression analysis in comparison with Table 7. The results are in Table 8, and they show an even more negative effect grain price has on bride-price. The coefficient has gone from -3.61 in Table 6 to -5.33 in Table 7, and to -6.22 in Table 8, with a statistical significance of 1%. This shows that purchasing a wife or a concubine is more sensitive to risk events (which cause a rise in food prices) than all other types of marriages, which systematically confirms the hypothesis that “when left with no options in face of natural hazards, people resort to selling wives (daughters-in-law) to survive”. The reason for drawing this conclusion is that if the negative coefficient between grain price and bride-price here has been due to a reduced demand for wives during a natural hazard, as opposed to an increase in activities of buying and selling wives, then prices of staple food should have similar effects on the costs of marriages across the board (normal marriages, wife purchases and remarriages of widows alike).

The number of chaste women on bride-price remains positive, but the magnitude of its coefficient has decreased, i.e., the effect has now become slightly less significant. This proves that in a particular place, the number of chaste women tends to affect widows’ choices of remarrying more than a family’s decision to sell a wife or daughter-in-law. The number of Confucian temples continues to have a positive effect on bride-price but with limited significance. The number of schools now has a negative coefficient, but an unpronounced one. There is irregularity in the effects of the number of Buddhist temples and Taoist temples, but their significances are not large. The pressure on families represented by the population density of a place now has a negative coefficient from a previous positive but insignificant number. The current statistical significance is 5%. This states that where population density is high, activities involving buying and selling a wife is likely to increase. This leads to an increased supply, and the reason is quite possibly the higher pressure one experiences residing in this community. The effect from the rate of homicides due to land-related debts is positive. This is likely a result of a higher volume of land purchase and other money exchanges including lending and borrowing. The result is a lesser need to use women as a form of insurance against risks, leading to a lower supply of women and a higher price on the market. However, the effect of this factor is not pronounced. Other variables retain similar effects as seen in previous tables.

Table 8: Regression results: wife and concubine selling only

	(1)	(2)	(3)	(4)	(5)
	wcprice	wcprice	wcprice	wcprice	wcprice
Grain price	-6.22*** (-3.46)	-6.29*** (-3.80)	-6.26*** (-3.77)	-6.23*** (-3.70)	-6.20*** (-3.67)
# of Confucian temples		8.90 (0.87)			7.23 (0.70)
# of schools			-0.21 (-0.23)		-0.52 (-0.54)
# of chaste women				0.39 (1.32)	0.44 (1.37)
# of Buddhist temples		-69.40 (-0.92)	60.54 (0.76)	62.15 (0.79)	-54.46 (-0.70)
# of Taoist temples		177.2 (0.83)	-220.0 (-0.84)	-225.9 (-0.88)	135.7 (0.61)
Population Density		-8.74** (-2.12)	-8.74** (-2.12)	-8.14** (-1.99)	-8.30** (-2.02)
Population Size		0.05 (1.47)	0.06 (1.47)	0.05 (1.27)	0.05 (1.30)
Land debt-related homicide rate		2.48 (0.85)	1.91 (0.65)	1.10 (0.37)	1.03 (0.34)
Marriage- and adultery-related homicide rate		-1.17 (-0.61)	-0.87 (-0.46)	-0.26 (-0.14)	-0.26 (-0.13)
Prefecture fixed effects	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y
<i>N</i>	1047	1015	1008	1001	1001
<i>R</i> ²	0.581	0.590	0.590	0.593	0.593

Remark: Heteroskedasticity-robust t statistic values are enclosed in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

From the analysis shown in Tables 6, 7 and 8, we can see that as grain price increases, risks against survival also increase, prompting activities involving selling and purchasing of women to increase, driving down their price. This chain of cause and effect is very evidently supported by the data obtained from the criminal reports. It also agrees with our theory of women being used as an insurance apparatus. The other pronounced conclusion drawn here is that efforts to honour chaste behaviors among women have a positive effect on bride-price. Even though the number of chaste women shows most influence on a widow's decision to remarry, it suppresses, to a certain extent, both regular marriages and the buying and selling of wives, as the promotion of chastity will lead to a decrease of pre-marital sexual activities and the number of marriages experienced in a woman's lifetime. The result is a negative impact on the supply of women on the market, driving up the value of available women on the market. In other words, efforts to recognize chaste women add to their value a "chaste" premium.

4. Regression on wife and concubine-selling sample with an instrumental variable.

The key of the hypothesis “women for insurance” lies in the fact that activities of buying and selling wives come from having to deal with survival risks manifested as a shortage of food supply. Previously in this paper, using grain price to characterize food crisis has also confirmed our hypothesis, but factors that cause a rise in food costs are plenty; a shortage in food supply is only one among many. We want to more clearly show how threats to survival affect food supply, impacting food prices as a result, and subsequently having an effect on the buying and selling of wives. To do so, we use the probability of a drought as a risk event parameter to estimate how grain price affects bride-price. From section 3’s statistical description, we understand that a drought has a more significant impact on an agricultural society than a flood (Jia, 2014), as it decimates food supply more severely. This results in a more significant driving up of food prices, creating more significant threats to lives. More people will be forced to sell wives in the end. Here, we use dummy variable “draught” as an instrumental variable. “Draught”= 1 if the climate is exceptional drought, “draught”= 0 if the climate is limited drought, limited flood, favorable conditions, and exceptional flood.

The “drought” variable satisfies the two basic criteria for an instrumental variable: One, any variance in climate is an external factor. Two, in a climate-dependent agrarian society, rainfall is an important input, so an extreme drought will lead to a dramatic decrease in food supply, causing a rise in food prices. This more clearly shows that a rise in food prices is a risk caused by a drought event, and not by another external economic factor related to bride-price. For example, in a certain place where the existence of advanced technologies has driven up food prices, those food prices intrinsically provide a buffer to absorb risks. In this case the price of women may become higher (as there is less necessity but a higher demand for wives). If such is the case, our previous regression analysis may have underestimated the effects of a drought on bride-price.

Table 9 contains results of a two-stage regression that correspond to those in Table 8. The bottom part of Table 9 contains results from stage one of the regression. The results indicate that a drought does lead to a large increase in grain price. In a drought year grain price is roughly 0.25 taels of silver higher than that in a non-drought year, with a statistical significance of 5%. Therefore, the “drought” variable is a strong instrumental variable and this proves its effectiveness. Results from the second stage of the regression (the top part of Table 9) show that the rise in food prices caused by a drought has a much larger (in magnitude) negative effect on bride-price (coefficients all fall within -17.78 and -19.19) than a rise in food prices caused by other factors than drought. This confirms what has been previously conjectured regarding the instrumental variable. Using column 5 in Table 9 as an example, when a drought causes grain price to rise by 1 tael of silver, bride-price falls by 19.02 taels. The two-stage results show that the average grain price in a drought year is 0.25 taels of silver more than in a non-drought year, and bride-price is 4.76 (19.02 x 0.25) taels of silver less than in a non-drought year. In other words, a drought causes grain price to rise by 15%, and bride-price to fall by 23%.

Table 9: Instrumental regression performed on samples of wife and concubine selling only

	(1)	(2)	(3)	(4)	(5)
	wcprice	wcprice	wcprice	wcprice	wcprice
Grain price	-19.19** (-2.29)	-18.24** (-2.10)	-17.78** (-2.08)	-18.98** (-2.08)	-19.02** (-2.14)
# of Confucian temples		-0.04 (-0.13)			-0.16 (-0.58)
# of schools			0.12 (0.14)		-0.07 (-0.07)
# of chaste women				0.30 (0.92)	0.31 (0.90)
# of Buddhist temples			0.63 (1.58)	0.46 (1.12)	0.49 (1.15)
# of Taoist temples			-0.14 (-0.06)	0.33 (0.13)	0.54 (0.23)
Population Density		-7.23** (-2.47)	-7.21** (-2.45)	-6.64** (-2.26)	-6.66** (-2.24)
Population Size		0.07** (2.38)	0.07** (2.36)	0.07** (2.12)	0.07** (2.17)
Land debt-related homicide rate		0.45 (0.15)	-0.03 (-0.01)	-1.37 (-0.42)	-1.38 (-0.43)
Marriage- and adultery-related homicide rate		-1.16 (-0.59)	-0.86 (-0.44)	-0.16 (-0.08)	-0.16 (-0.08)
Prefecture fixed effects	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y
<i>N</i>	1043	1015	1008	1001	1001
<i>R</i> ²	0.523	0.542	0.545	0.538	0.538

First-stage of Regression

	(1)	(2)	(3)	(4)	(5)
	grain price	grain price	grain price	grain price	grain price
Drought or not	0.27**	0.25**	0.26**	0.24**	0.25**
F value	5.62	5.34	5.43	4.80	4.97
<i>N</i>	1043	1015	1008	1001	1001
<i>R</i> ²	0.708	0.724	0.724	0.725	0.725

Remarks: Values of the “drought” variable: 1 for True (a drought), 0 for False (a non-drought, which includes wet, relatively wet, normal, relatively dry years). Heteroskedasticity-robust t statistic values are enclosed in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 9 uses the virtual “drought” instrumental variable, and in this analysis a flood has been included in a non-drought event. However, because a flood also impact agricultural productions, this inclusion may not have given the ideal scenario. Because of this, we remove data of flood years and relatively wet years, which leaves only “normal” and “relatively dry” as the only “non-drought” scenarios (consistent with what has been considered a “normal” year in Jia’s study, 2012), and redefine the virtual “drought” variable. Then, we use this newly defined virtual variable as an instrumental variable for grain price to perform another two-stage regression. The results obtained from this

iteration agree with previous ones (details of results omitted here due to space limitation). Using column 5 once again as an example: the new stage-one results show that a drought causes food prices to exceed those in a normal (non-drought) year by 0.28 taels of silver, also with a 5% statistical significance. The second stage yields the following coefficient: for every rise of 1 tael in grain price, bride-price falls by 18.33 taels of silver. This agrees with previous results in Table 9.

The above large sample quantitative analysis confirms the use of women for insurance purposes in traditional societies, and supports what such scholars as Xia (2009), Zhao (2008) and Pan (2010) have illustrated in their studies concerning the effects of natural hazards on agrarian societies. It also, through using the instrumental variable method, quantitatively analyzes the conduction mechanism from a natural hazard to activities of wife transactions, quantifying and interpreting the impact.

V. Robustness Checks

The data in this study come from criminal reports from the Qing dynasty. Because these cases were only recorded whenever there was a murder, the sample might be biased. First, the cases sampled may lack randomness (independence): whether or not an excessively high price in a bride had led to a subsequent homicide (i.e., there was an intrinsic cause-and-effect relationship between bride-price and homicide) may have distorted the results. Of the 3,119 homicide cases in our data there were only 41 cases involving an agreed price being revised at a later time for extra profit; it was very rare that an underpriced wife would eventually lead to homicide. A study by Wu (2010) on prefectures in the south has shown that most cases of revising an original deal price for extra profit involved provincial, unruly troublemakers; these cases were not commonplace. As a result, we have reasons to eliminate lower bride-price bias. Higher bride-price bias may occur. According to Zhao et al. (2008), years plagued by severe natural hazards usually accompanies extremely low bride-prices. The potential overestimations of women prices would tend to have occurred in plagued years. If that has been the case, then our results may have underestimated the impact that food prices (i.e., natural hazards) had on prices of women. As a result, the correlations computed in this study may actually be the lower bound. This means that the degree of our hypothesis (women being used as insurance) was higher in reality than what we have anticipated. Second, in a homicide case, the content that deals with the purchase of the wife was not the focus of the case (i.e., the case was not reported because the transaction itself was against the law). In addition, planned murders made up only a relatively small percentage of homicides. Any transactions involving the purchase of a wife or widow could lead to homicide. The result is that these cases demonstrate certain randomness. Third, even if there were sampling discrepancies in our data, as long as there is a uniform distribution of probability across all years in all prefectures, in other words, discrepancies in sampling remain constant throughout, then their existence will have little influence on our conclusion. This is due to the fact that our tests on the hypothesis of women as insurance mainly concern cross-year and cross-region relative variations and not absolute bride-price levels. Finally, potential errors likely lie within the handling of data with regard to heteroskedasticity, imbalance in panel data, payment in kind affecting bride-prices, heterogeneity between

selling a wife and holding her ransom, the trends in silver price, and civil unrests, etc. We discuss each of these in the following.

1. Heteroskedasticity

Suppose that in every transaction the price follows a random distribution (a similar discussion is applicable to other types of marriages). If the variance from year to year remains the same and is σ^2 , because we average bride-prices from all years and all prefectures, the variance across these years and places is $\frac{\sigma^2}{n_{it}}$, and it contains

heteroskedasticity. To eliminate this heteroskedasticity, we perform a generalized linear regression. Table 10 shows the results of a standard two-stage weighted regression, based on the regression formula used in column 5 of Table 8 and column 5 of Table 9. The ordinary least square (OLS) estimates in Table 10's column 1 are similar to those in Table 8. As for column 2's regression coefficients for correlation between grain price and bride-price, even though they have dropped in magnitude from -19.02 to -17.00, their statistical significance remains at 5%, and have not overturned our hypothesis. The coefficients for the number of Confucian temples are the most prominent. Coefficients for the number of chaste women, whether in weighted OLS or weighted 2SLS, are positive and are significant. This is consistent with our baseline argument.

2. Unbalanced panel data

The data we use are panel data with cross-sections are a particular prefecture and a particular year. This set of data, however, is unbalanced because of missing data points. As a result, we use provinces where there are minimal missing data for performing the regression, minimizing the effects of holes in the data set. Among the 19 provinces in our sample, 11 have more than 100 wives-trading related cases (among these the minimum is 129 cases). The remaining provinces have less than 100 cases. In order to avoid problems caused by missing data, we have only used provinces with more than 100 cases as our sample and repeated regression on them. The results are shown in columns 3 and 4 of Table 10: Compared with tables 8 and 9, the OLS and two-stage regression coefficients obtained from this data subset are similar with previous values (obtained from the full data set), with levels of significance at 1% and 5%. This shows that the missing data have not affected our conjecture on the impact of a natural hazard on wife purchase activities.

Table 10: Weighted estimates and regression on provinces with 100 or more cases for observation

	Weighted regression		Regression on data from provinces with >100 cases	
	(1) OLS	(2) 2SLS	(3) OLS	(4) 2SLS
	wcprice	wcprice	wcprice	wcprice
Grain price	-6.17***	-17.00**	-5.93***	-18.49**
	(-31.76)	(-2.08)	(-3.48)	(-2.05)
# of Confucian temples	1.70**	0.10	1.44	-0.15
	(2.39)	(0.47)	.	(-0.38)
# of schools	-1.25***	-0.60	-0.60	0.03
	(-12.32)	(-1.49)	(-0.54)	(0.03)
# of chaste women	0.74***	0.33**	-0.25	-0.05
	(19.07)	(2.07)	(-0.41)	(-0.09)
Other control variables	Y	Y	Y	Y
Prefecture fixed effects	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y
<i>N</i>	1001	963	<i>N</i>	825
<i>R</i> ²		0.885	<i>R</i> ²	0.605

Remark: (1) and (2) heteroskedasticity-robust t statistic values are enclosed in parentheses. (3) and (4) heteroskedasticity-robust t statistic values are enclosed in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

3. Payment-in-kind

In the samples there are cases where the bride-price has taken the form of payment-in-kind. Because the object in exchange does not have a market price, it is difficult to be converted into a monetary value, resulting in under-evaluation of some of the recorded bride-prices. But because transactions that involve payment-in-kind have a tendency to have an under-valued bride-price, we simply discard the lowest 5% and 10% among bride-price samples to perform further regressions in order to examine the effect of these cases. The results are shown in Table 11. After removing the lowest 5% and 10% of bride-price samples, both the OLS and 2SLS coefficients of grain price rise slightly and their values are non-negligible. This shows that removing cases involving payment-in-kind has little influence on the overall results.

Table 11: Effects of removing cases involving payment in kind

	After removing the lowest 5% of bride-price samples		After removing the lowest 10% of bride-price samples	
	(1) OLS	(2) 2SLS	(3) OLS	(4) 2SLS
	wcprice	wcprice	wcprice	wcprice
Grain price	-6.69***	-21.43*	-7.42***	-20.73*
	(-3.72)	(-1.92)	(-4.11)	(-1.67)
# of Confucian temples	4.53	-0.11	4.23	-0.15
	(0.45)	(-0.28)	(0.42)	(-0.38)
# of schools	-0.54	0.15	-0.53	0.12
	(-0.53)	(0.15)	(-0.52)	(0.11)
# of chaste women	0.44	0.25	0.47	0.29
	(1.33)	(0.85)	(1.39)	(0.93)
Other control variables	Y	Y	Y	Y
Prefecture fixed effects	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y
<i>N</i>	956	956	<i>N</i>	908
<i>R</i> ²	0.592	0.523	<i>R</i> ²	0.601

Remark: Heteroskedasticity-robust t statistic values are enclosed in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

4. Concubine selling and women trafficking

According to Table 1, the price for a concubine clearly surpassed that for a wife, and within the household a concubine would rank only above a maid. This means that wives and concubines very likely had separate markets, leading to noise while sampling their prices. Besides, kidnapping (holding someone random) and selling a wife are intrinsically different. Because of this, we remove both samples of concubine purchases and kidnap cases for further regression. The results, listed in Table 12, show that grain price coefficients here are similar to those in Tables 8 and 9. Their statistical significance also remains the same.

Table 12: Removing the effects of concubine purchases and kidnap cases

	Removing concubine purchase samples		Removing kidnapping samples	
	(1) OLS	(2) 2SLS	(3) OLS	(4) 2SLS
	wcprice	wcprice	wcprice	wcprice
Grain price	-6.05*** (-3.30)	-23.34** (-2.25)	-5.88*** (-3.14)	-16.68** (-2.01)
# of Confucian temples	0.64 .	0.11 (0.37)	2.08 (0.20)	0.22 (0.69)
# of schools	-0.07 (-0.06)	0.50 (0.47)	-0.27 (-0.19)	-0.01 (-0.01)
# of chaste women	0.21 (0.41)	0.11 (0.25)	-0.46 (-0.81)	-0.56 (-1.25)
Other control variables	Y	Y	Y	Y
Prefecture fixed effects	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y
<i>N</i>	866	866	781	781
<i>R</i> ²	0.622	0.510	0.662	0.617

Remark: Heteroskedasticity-robust t statistic values are enclosed in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

5. Silver price trend and social unrest

Figure 1 shows that in the first half of the nineteenth century both bride-price and grain price declined simultaneously. This might have had to do with an outflow of silver from the country, leading to currency devaluation. In addition, the Taiping Rebellion, which took place between 1851 and 1864, had tremendous impact on the society at the time. First, that led to interruptions or irregularities in the reporting of food prices. Second, it led to carelessness in the way prefecture officials handled and reported cases. These affected the comprehensibility of both grain price and bride-price (Wang, 2000). As a result, we discard samples from 1840 to 1864 and re-perform regression, and the results are listed in columns 1 and 2 of Table 13. We observe that this has little effect on the results.

The price unit used here is silver in taels. After 1840 there was a period when bride-price and grain price saw a parallel trend. To a certain extent this was caused by nominal prices being used, and this indicates that the trend in silver value may have an impact on our estimation. Because we do not have an index of inflation and deflation in silver value, it is difficult to convert bride-prices and food prices into actual prices. As a result, we perform logit regression on bride-price and grain price, eliminating effects due to fluctuations in silver value by fixing the time

variable. Suppose during the year t , the index for silver value is P_t . Then the actual bride-price is $wcprice_{it} / P_t$

and the actual grain price is $\frac{foodprice_{it}}{P_t}$. The formula for logit regression on actual prices is:

$$\log\left(\frac{wcprice_{it}}{P_t}\right) = \alpha + \beta \log\left(\frac{foodprice_{it}}{P_t}\right) + \gamma X + \eta_i + \theta_t + \varepsilon_{it}$$

Rearranging the above formula, we obtain: $\log wcprice_{it} = \alpha + \beta \log foodprice_{it} + \gamma X + \eta_i + \xi_t + \varepsilon_{it}$

where $\xi_t = \theta_t + (\beta - 1) \log P_t$. A logit regression will better resolve the question of actual value versus nominal values.

Table 13: Weighted estimates and logit estimates

	After removing samples from 1840-1864		Logit regression	
	(1) OLS	(2) 2SLS	(3) OLS	(4) 2SLS
	wcprice	wcprice	ln(wcprice)	ln(wcprice)
Grain price	-5.73*** (-3.05)	-17.68** (-2.09)	ln(grain price) -0.42** (-2.46)	-3.3* (-1.77)
# of Confucian temples	-0.35 (-0.00)	0.30 (0.83)	# of Confucian temples 0.38 (0.97)	0.01 (0.62)
# of schools	-0.82 (-0.80)	-0.21 (-0.22)	# of schools -0.02 (-0.45)	0.04 (0.49)
# of chaste women	0.51 (1.44)	0.29 (0.93)	# of chaste women 0.01 (0.36)	-0.02 (-0.64)
Other control variables	Y	Y	Other control variables	Y
Prefecture fixed effects	Y	Y	Prefecture fixed effects	Y
Year fixed effects	Y	Y	Year fixed effects	Y
<i>N</i>	848	848	<i>N</i>	1001
<i>R</i> ²	0.588	0.540	<i>R</i> ²	0.417

Remark: Heteroskedasticity-robust t statistic values are enclosed in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Columns 3 and 4 of Table 13 list results of logit regression after the trend in silver has been eliminated. The coefficient of grain price, obtained from the two-stage logit regression, shows a reduced significance from before. This indicates that variations in silver value have had an impact on estimates in grain price and bride-price, but the statistical significance is at 10%. Also, the correlation coefficient between grain price and bride-price remains negative, which is consistent with previous results. The 2SLS logarithmic estimates show that for every 1% rise in grain price, bride-price falls by 3.3%. This is greater than the previous 1.54% obtained from non-logit regression. Nevertheless, whatever the scenario, bride-price fluctuates more than grain price in terms of percentage, indicating

that bride-price is more sensitive to natural hazards than grain price, even though the two respond oppositely to natural hazards.

The above various examinations shows the robustness of our argument: when a shortage in food supply leads to a rise in food prices, reflecting a higher risks against survival, more wives and daughters are sold to mitigate those risks, resulting in a drop in bride-price.

VI. Conclusion

Throughout human history, be it in traditional China, India, Africa or Britain, there have been and even continue to be the practice of wife purchases. In addition, not only have such practices been found in isolated societies, the details of these practices in different locations are strikingly similar. The reason for this phenomenon is that in the ancient time, before financial market, insurance market and other forms of long-term loans had developed and become commonplace, all these isolated societies still had to deal with many risks against survival. Women in all these places became a personified form of insurance. Of course, these societies could have sold husbands and sons for survival as well (using the insurance value of men), but as mentioned by Engels (2003), Alesina, Giuliani and Nunn (2013), agriculture has caused human societies to become patriarchal. Fathers did not only own all assets in the household, but possessed also all control power over his wives and children. This family system and the corresponding Confucian culture inevitably caused male-sale to become costly. In turn, costs for women were relatively lowered. For example, in a patriarchal society, if a woman's parents were to purchase a husband for her, the husband, even if he would adopt his wife's maiden name as his last name, might not want to settle in his wife's household for long. He would every now and then think about returning to his natal home. His marital family might not trust him to stay for his entire life either. In comparison, selling a wife or daughter away would present much less uncertainty. Because of this, in a traditional society without financial market, women, and not men, were more likely to be used for insurance.

As have been mentioned previously, even though historical literature has not systematically proposed the hypothesis of "using women as insurance", scholars have analyzed various cases and identified the practice—when a disaster strikes, women selling increases while prices of women decrease accordingly (Xia, 2009; Zhao, 2008; Pan 2010, etc.). This current paper does not only systematically put forth this hypothesis, it more importantly tests this hypothesis using a large data set of bride-prices from China's 1736-1896 period. With the data, this paper performs a large-sample quantitative analysis on the hypothesis. The analysis shows that, on the one hand, the severity of a natural disaster is reflected through fluctuations in grain price (because precious metals were used during the Qing dynasty, the unit for prices tended to be steady). On the other hand, because a shortage of food can usually be associated with a flood or a drought, food prices during these natural hazards tend to increase, forcing families to sell women for survival. This increases the supply of women on the market, causing their prices to fall during a time

when survival is under threat. In this study we have found that prices for a married woman are more sensitive to risky events than costs of a regular marriage, which is consistent with our hypothesis. Using drought as an instrumental variable in a two-stage estimation shows that a drought causes average grain price to rise by 0.25 taels of silver, but drives bride-price down by 4.56 taels at the same time.

A woman with higher power and status in her husband's household would not have cost as much at the time of marriage. The opposite is also true. During marriage procedures, who the seller is very much affects the negotiation of bride-price. The parents of a woman being sold doing the negotiation tends to result in a lower price, whereas a husband selling his wife or a mother-in-law selling her daughter-in-law tends to be driven by the intention to maximize profits, making the women to be sold more expensive.

Through performing quantitatively analysis on bride-prices during the Qing dynasty, we have found that chastity as a culture in a community has a strong influence on women being used as financial tools there. To a certain extent, the Qing's effort to recognize chaste women was put in place to directly address the demand for using women as insurance assets. This is to say, the reason why chastity was promoted to restrain only women and not men was because in a patriarchal society where people raise the young as an insurance against old age, sexual promiscuity among women would lead to genealogical confusions. Not knowing who one's father was (i.e. who had control and ownership over a child) would lead to social disorder, upsetting the system of possession among members of a society. As a result, in order to clearly define a system of property rights, the Qing dynasty reinforced the policy of recognizing chaste (chaste) behaviour among women, both married and unmarried. Over time, heeding this policy became a local culture, lowering the average number of marriages a woman would experience in her lifetime. Our analysis shows that where there were more chaste women in a prefecture, bride-prices were usually higher there as well (mainly because costs for a widow would usually become higher). This can be explained as such: as women there became less willing to be sold for marriage, especially for widows, they would only agree to a marriage if they could demand a higher purchase price. The number of Confucian temples and schools in a place similarly would have a positive impact on bride-prices there.

Even though using women as insurance assets does raise a traditional society's ability to mitigate risks, it obliterates a woman's spirit and sacrifices her freedom of choice. The reason why traditional societies did not have other options is because they did not possess a diversified financial market. Our study here shows that the development of the financial market can free both an individual and a family from becoming financial tools themselves. A financial market, therefore, lays the foundation for the liberation of women.

References

- [1] 岸本美绪，2001：《妻可卖否?——明清时代的卖妻、典妻习俗》，收录于台湾中研院台湾史研究所筹备处编《契约文书与社会生活(1600-1900)》。
- [2] 白凯，2003：《中国的妇女与财产：960~1949年》，上海书店出版社。
- [3] 步德茂著，张世明、刘亚丛、陈兆肆译，2008：《过失杀人、市场与道德经济：18世纪中国财产权的暴力纠纷》，社会科学文献出版社。
- [4] 曹树基，2001：《中国人口史》，上海，复旦大学出版社。
- [5] 陈顾远，2014：《中国婚姻史》，商务印书馆。
- [6] 陈鹏，1990：《中国婚姻史稿》，中华书局。
- [7] 陈志武，2009：《金融的逻辑》，国际文化出版公司。
- [8] 陈志武，彭凯翔，朱礼军，2013：《清代中国的量化评估——从命案发生率看社会变迁史》，清华大学2013年量化历史讲习班讨论稿。
- [9] 方行，1996：《清代的江南市镇探微》，《中国经济史研究》第3期。
- [10] 冯尔康，1990：《清代的婚姻制度与妇女的社会地位论述》，中国人民大学清史研究所编《清史研究集》第五集，光明日报出版社。
- [11] 弗里德里希·恩格斯，2003：《家庭、私有制和国家的起源》，人民出版社。
- [12] 郭松义，2000：《伦理与生活——清代的婚姻关系》，商务印书馆。
- [13] 郭松义，2001：《清代妇女的守节与再嫁》，《浙江社会科学》第1期。
- [14] 郭松义，2010：《中国妇女通史·清代卷》，杭州出版社。
- [15] 黄才庚，1987：《清末“改题为奏”研究》，《档案》，第4期。
- [16] 姜涛，1993：《中国近代人口史》，杭州，浙江人民出版社。
- [17] 劳伦斯·斯通，刁筱华译，2011：《英国的家庭、性与婚姻1500—1800》，商务印书馆。
- [18] 倪道善，1992：《明清档案概论》，四川大学出版社。
- [19] 彭凯翔，2006：《清代以来的粮价：历史学的解释与再解释》，上海：上海人民出版社。
- [20] 《清世宗实录》，北京：中华书局，1986。
- [21] 饶应祺，《同州府续志》光绪七年刊本。
- [22] 台湾中研院近史所，《清代粮价资料库》，<http://140.109.152.38/>。
- [23] 汤普森著，沈汉、王加丰译，2002：《共有的习惯》第七章《买卖妻子》，商务印书馆。
- [24] 王跃生，2000：《十八世纪中国婚姻家庭研究——建立在1781-1791年个案基础上的分析》，法律出版社。
- [25] 王跃生，2001：《十八世纪后期中国男性晚婚及不婚群体的考察》，《中国社会经济史研究》第2期。
- [26] 文章来自：<http://qkzz.net> 全刊杂志赏析网(qkzz.net)原文地址：

<http://qkzz.net/article/6b72f68e-cbae-4971-88e0-08e6844f664c.htm>

- [27] 吴慧, 1988: 《中国历代粮食亩产研究》, 农业出版社。
- [28] 吴佩林, 2010: 《南部档案所见清代的“嫁卖生妻”》, 《清史研究》第3期。
- [29] 夏明方, 2004: 《“卖一口, 救十口”——关于妇女买卖的比较研究》, 《学习时报》12月20日。
- [30] 云妍, 2010: 《十八世纪中国官绅家产及其结构: 以清代抄产档案为中心的研究》, 清华大学博士后研究报告。
- [31] 赵晓华, 2008: 《晚清饥荒中的妇女买卖——以光绪初年华北大旱灾为中心》, 《中国史研究》第5期。
- [32] 滋贺秀三著, 张建国、李力译, 2012: 《中国家法原理》, 商务印书馆。
- [33] 中国第一历史档案馆, 1985: 《中国第一历史档案馆馆藏档案概述》, 档案出版社。
- [34] Alesina, Alberto, Paola Giuliano and Nathan Nunn, 2013, “On the Origins of Gender Roles: Women and the Plough”, *Quarterly Journal of Economics*, Volume 128, No 2, May 2013.
- [35] Angrist, Joshua and Jörn-Steffen Pischke. *Mostly Harmless Econometrics: an Empiricist's Companion*. Princeton: Princeton University Press, 2009.
- [36] Bai, Ying, and James Kai-sing Kung, 2011. “Climate Shocks and Sino-nomadic Conflicts.” *The Review of Economics and Statistics* 93 (3): 970–981.
- [37] Bengtsson, Tommy, Cameron Campbell, James Lee et al. 2004. *Life under Pressure: Mortality and Living Standards in Europe and Asia, 1700-1900*. Cambridge: MIT Press.
- [38] Cheung, Steven N. S., 1972. “The Enforcement of Property Rights in Children, and the Marriage Contract”, *The Economic Journal*, Vol. 82, No. 326, pp. 641-657.
- [39] Coase, R. H. 1959. “The Federal Communication Commission”, *The Journal of Law and Economics*.
- [40] Dasgupta, Partha. 1993. *An Inquiry into Well-Being and Destitution*. Oxford: Oxford University Press.
- [41] Ehrlich, Isaac and Gary S. Becker, 1972. “Market Insurance, Self-Insurance, and Self-Protection”, *Journal of Political Economy*, Vol. 80, No. 4, pp. 623-648.
- [42] Goldschmidt, Walter, 1974. “The Economics of Bride-price among the Sebei and in East Africa”, *Ethnology*, Vol. 13, No. 4, pp. 311-331.
- [43] Gray, R. F. 1960. “Sonjo Bride Price and the Question of African ‘Wife Purchase’”. *American Anthropologist*, 62: 34-57.
- [44] Gulliver, P., and P. H. Gulliver. 1953. *The Central Nilo-Hamites*. London.
- [45] Herlihy, David V., and Christiane Klapisch-Zuber. *Tuscans and their families. A Study of the Florentine Catasto of 1427*. New Haven: Yale University Press, 1985.
- [46] Jia, Ruixue. 2012. “Weather Shocks, Sweet Potatoes and Peasant Revolts in Historical China.” working paper.
- [47] Kung, James Kai-sing and Chicheng Ma. 2013. “Can Cultural Norms Reduce Conflicts? Confucianism and Peasant Rebellions in Qing China.” Working Paper, Hong Kong University of Science and Technology.
- [48] Lang, Olga, 1946. “Chinese Family and Society”, New Haven: Yale University Press.
- [49] Levine, Etan, 1997-2001, “Biblical Women's Marital Rights”, in *Proceedings of the American Academy for*

- Jewish Research*, Vol. 63 (1997 - 2001), pp.87-135. Published by American Academy for Jewish Research.
- [50] Menefee, Samuel. "Wives for Sale: An Ethnographic Study of British Popular Divorce." New York, St. Martin's Press, 1981.
- [51] Miguel, Edward, Shanker Satyanath, and Ernest Sergenti, "Economic Shocks and Civil Conflict: an Instrumental Variables Approach," *Journal of Political Economy* 112 (2004), 725–753.
- [52] Parenti, G. 1942. *Prezziemercato a Siena (1546-1765)*, Florence.
- [53] Pomeranz, Kenneth. *The Great Divergence: Europe, China, and the Making of the Modern World Economy*. Princeton: Princeton University Press, 2000.
- [54] Rigby, P. 1969. "Cattle and Kinship Among the Gogo: A Semi-Nomadic Society of Central Tanzania." *Ithaca*.
- [55] Rosenzweig, Mark R. 1988. "Risk, Implicit Contracts and the Family in Rural Areas of Low-Income Countries." *Econ. J.* 98: 1148-70.
- [56] Rosenzweig, Mark R. and Oded Stark, 1989. "Consumption Smoothing, Migration, and Marriage: Evidence from Rural India", *Journal of Political Economy*, Vol. 97, No. 4, pp. 905-926.
- [57] Rosenzweig, Mark R. and Kenneth I. Wolpin. 1993. "Credit Market Constraints, Consumption Smoothing, and the Accumulation of Durable Production Assets in Low-Income Countries: Investments in Bullocks in India", *Journal of Political Economy*, Vol. 101, No. 2, pp. 223-244.
- [58] Sidner, Sara, 2009, "Farmers sell wives to pay debts in rural India", CNN, October 23, 2009.
- [59] Townsend, Robert M. 1995. "Consumption Insurance: An Evaluation of Risk-Bearing Systems in Low-Income Economies", *The Journal of Economic Perspectives*, Vol. 9, No. 3, pp. 83-102.
- [60] Udry, Christopher. "Risk and Insurance in a Rural Credit Market: An Empirical Investigation in Northern Nigeria", *The Review of Economic Studies*, Vol. 61, No. 3 (Jul., 1994), pp. 495-526.