Internal Migration, Gender, and Education in Urban Labour Markets: Evidence on Local Registered Residents from China's 2014 Hukou Reform

1 Introduction

Large-scale population movements and their consequences for labour-market allocation and the welfare of local residents have long been central topics in labour economics. A substantial body of work on international migration shows that migrant inflows may exert competitive pressure on low-skilled native workers through labour supply shocks but may also generate heterogeneous effects across skill and gender groups via channels such as task reallocation, structural transformation, and the outsourcing of household production. Classic studies include Borjas (2003), who, from the perspective of a downward-sloping labour demand curve, emphasises the displacement effect of immigration on native wages. And Dustmann, Frattini and Preston (2013), who document that the impact of immigration shocks on the native wage distribution is not symmetric across quantiles and may generate different redistributive effects at the bottom and the top. At the same time, work exemplified by Cortes and Tessada (2011) shows that low-skilled migrants entering domestic work and personal services can relax time constraints for medium- and high-skilled women, thereby increasing their labour supply and facilitating career progression. Taken together, these studies indicate that understanding the labour-market effects of immigration requires placing skill composition and gender at the core of the analytical framework.

Compared with cross-border migration, China's internal rural-urban migration is larger in scale and has long been profoundly shaped by the household registration (hukou) system. Since the promulgation of the Household Registration Regulations of the People's Republic of China[1] in 1958, the hukou system based on the agricultural/non-agricultural (rural/urban) hukou distinction has, for an extended period, tightly linked key rights such as access to education, formal employment opportunities, and social security to one's place of registration. This institutional arrangement has effectively segmented the opportunity set of rural migrants and that of urban local hukou holders (Wu and Treiman, 2004). Following the reform and opening-up, marketisation and industrialisation spurred large flows of rural labour across regions and between rural and urban areas, giving rise to groups of rural migrant workers and the urban floating population. Nonetheless, their access to public services and social security in cities has long remained restricted. As summarised by Song (2014), in China, the hukou system functions not only as a tool of demographic and administrative registration, but also as a key institutional arrangement determining whether individuals can be fully incorporated into the urban welfare system. Consequently, any analysis of the economic consequences of internal migration is difficult to conduct without explicitly considering the constraints imposed by the hukou system.

Against this backdrop, the Opinions of the State Council on Further Promoting the Reform of the Household Registration System[2] issued in 2014 marked the beginning of a new round of nationwide hukou reform. The reform classified cities into several tiers based on the size of the urban resident population. It fully removed hukou entry restrictions in established towns and small cities, gradually relaxed hukou restrictions in medium-sized cities, introduced differentiated but attainable settlement requirements in large cities with urban populations of 1-3 million and 3-5 million, and strictly controlled population growth in megacities with urban populations exceeding 5 million. Overall, the reform substantially lowered hukou entry thresholds in non-megacities, while leaving settlement

[1] https://www.nhc.gov.cn/wjw/flfg/202505/4ff7613b24f542d48f98fa5b540fd7f2.shtml
[2] https://www.gov.cn/gongbao/content/2014/content_2729568.htm

restrictions in megacities unchanged. This tiered hukou policy, grounded in city size and carrying capacity, provides an important institutional quasi-natural experiment for identifying the labour-market effects of relaxing internal migration constraints.

A recent strand of research has exploited the 2014 hukou reform to study the multifaceted consequences of easing internal migration restrictions. An et al. (2024) divide cities into non-megacities with populations below 5 million and megacities with populations above 5 million and construct a city-year difference-in-differences (DID) framework. They find that the reform significantly relaxed in-migration constraints for non-megacities, leading to a relative decline in migrant wages in non-megacities compared with megacities, while its overall effects on local employment and wages are modest. Liu, Xu and Zou (2024), focusing on firms and entrepreneurial activities, show that lower mobility barriers help attract more potential entrepreneurs and high-productivity firms, thereby fostering business registrations and the expansion of entrepreneurial activity. Using CFPS data, Ye et al. (2024) document that the hukou reform improved migrant children's access to public education and raised household education expenditure, thus promoting human capital investment. Zhang et al. (2024) further shift the focus to urban natives and find that in a round of hukou entry-threshold reform, inflows of high-skilled migrants have limited effects on aggregate employment and income levels of urban locals but induce occupational restructuring and inter-sectoral mobility among natives, with particularly pronounced impacts on medium- and high-skilled local workers. Collectively, this literature suggests that using hukou reform as an exogenous shock, incorporating city size to construct multi-intensity DID or event-study frameworks, and identifying reform effects via parallel-trend tests and a battery of robustness checks constitutes a feasible empirical strategy.

However, existing studies based on the 2014 hukou reform may leave two important gaps. First, most of the work focuses on migrants themselves (for example, wages, human capital investment, and health) or on macro-outcomes (such as entrepreneurship and innovation), that is, on migrant returns and city-level performance. In contrast, relatively little attention has been paid to the labour-market outcomes of urban local registered residents, especially low-educated women among them. Zhang et al. (2024) take an important step forward by examining the reform's effects on labour-market outcomes of urban natives, but their emphasis lies on the inflow of high-skilled migrants and the employment reallocation effects on medium- and high-skilled local workers. A systematic analysis of different subgroups along the gender-education dimension (for example, low-educated women) is still lacking. Second, with respect to the impact of low-skilled migrants on low-skilled natives, both international and Chinese studies have tended to emphasise potential competitive and displacement effects. Yet, under the combined context of relaxed hukou constraints, ongoing upgrading of the urban industrial structure, and the expansion of the domestic-service market, empirical evidence remains limited on whether inflows of low-skilled migrants might generate net positive effects for some disadvantaged groups via channels such as task reallocation and the outsourcing of household production.

This paper focuses on a concrete and policy-relevant question: in the context of the 2014 hukou reform, which relaxed hukou entry thresholds in small and medium-sized cities and accelerated the incorporation of low-skilled migrants into urban citizenship, how do internal migrant inflows affect the labour-market outcomes of urban local registered residents, particularly the employment, working hours, and wages of low-educated women among them? Relative to the existing literature, this paper adopts two key analytical perspectives. First, we define urban local registered residents as working-age individuals who, at the time of the survey, both hold an urban hukou and reside in the corresponding city. This definition is consistent with mainstream studies of urban natives based on urban household surveys or household panel data. Second, from the outset, we incorporate gender and education (as a

proxy for skill) as two core dimensions in both the theoretical and empirical frameworks and systematically examine the heterogeneous effects of reform-induced low-skilled migrant inflows on local workers defined by different gender-education combinations.

Empirically, we first draw on the 2011-2017 China Migrants Dynamic Survey (CMDS) to construct city-year level indicators of migrant composition, and examine changes in the educational attainment, gender structure, and industry distribution of migrant populations across cities before and after the 2014 reform. Based on city size, we designate cities with populations above 5 million, in which hukou policies were not substantially relaxed, as the control group. Cities with populations of 3-5 million, 1-3 million, 0.5-1 million, and below 0.5 million are divided into four treatment groups according to the degree of relaxation in hukou entry conditions specified in the reform document[3]. We then build multi-intensity DID and event-study frameworks to verify that the reform indeed generated significant first-step effects by attracting more low-educated migrants into non-megacities. Next, using data from the China Household Finance Survey (CHFS) for 2011, 2013, 2015, 2017, and 2019, we focus on working-age urban local registered residents and estimate the average treatment effects of the reform on local labour-market outcomes, measured by employment status, working hours, and monthly wages, and conduct systematic heterogeneity analyses along the dimensions of gender and education. Finally, combining data from the China City Statistical Yearbook for 2000-2019, we provide evidence on possible supply-side and demand-side mechanisms from the perspectives of job stability, household spending on domestic services, and changes in the sectoral employment structure of cities.

Our preliminary empirical results can be summarised as follows. First, city-level analysis based on CMDS shows that, after controlling for city fixed effects, year fixed effects, and pre-reform baseline city economic characteristics, the 2014 reform significantly increased the share of low-educated (relative to high-educated) migrants in non-megacities, with more pronounced changes in small and medium-sized cities. This pattern is consistent with the policy design, which mainly lowered hukou thresholds in small and medium-sized cities and thereby primarily affected low-educated migrants who had previously faced stronger institutional constraints. Second, in the full sample of urban local registered residents drawn from CHFS, employment probabilities and working hours in treated cities increased significantly relative to control cities after the reform, while positive changes in monthly wages are concentrated mainly in some groups of small and medium-sized cities. Third, in regressions stratified by gender and education, we find that these improvements are more pronounced in the female and low-educated subsamples, with low-educated women exhibiting the most salient gains in employment and working hours.

Regarding mechanisms, we assemble evidence for a joint supply-side-demand-side explanation along three dimensions. On the supply side, at the individual level, we observe a marginal increase in the share of urban local registered residents, particularly women, who hold relatively more stable jobs after the reform. At the household level, we find that both the incidence of domestic-service use and spending on domestic services rise in certain cities and household types. This is consistent with the mechanism whereby low-skilled migrants enter domestic and personal service markets and provide households with opportunities to outsource housework. Related international evidence suggests that the expansion of domestic-service markets can increase labour-force participation and working hours among medium- and high-skilled women by relaxing their time constraints (Cortes and Tessada, 2011), while studies on household division of labour and female labour supply in China likewise show that care responsibilities within the household impose significant constraints on women's paid work (Dong and An, 2015; Qi

[3] We construct city groups based on 2014 urban area population figures from the dataset on population and construction land for Chinese cities (as shown in Figure 1); the detailed list of cities is reported in Table A10 in the Appendix.

and Dong, 2016).

On the demand side, regression results based on the China City Statistical Yearbook indicate that, after the reform, employment in less skill-intensive industries and in sectors with relatively high female employment shares or more gender-balanced employment structures exhibit statistically significant or marginally significant expansion in treated cities. This pattern is directionally consistent with the evidence in Liu, Xu and Zou (2024) and Zhang et al. (2024) that the reform promoted entrepreneurship and the development of private firms, thereby expanding local labour demand. In the absence of micro-level data on task content and firms, we interpret these findings cautiously as indicating that, under the combined influence of reform-induced low-skilled migrant inflow and urban industrial expansion, low-educated local women were not systematically crowded out. Instead, their employment and working hours improved, which may reflect a certain degree of industry- and occupation-based task specialisation rather than simple one-to-one job competition.

In sum, this paper makes three main contributions. First, using the 2014 hukou reform as an exogenous shock and a multi-intensity difference-in-differences framework, we provide a systematic analysis of how the relaxation of internal migration restrictions affects the labour-market outcomes of urban local registered residents, with particular attention to low-educated women. In doing so, we extend the research perspective on immigration shocks to native labour markets, traditionally grounded in international migration, to the specific institutional context of China's internal migration and hukou reform. Second, in terms of both methodology and research focus, this paper complements recent studies based on the 2014 hukou reform, including An et al. (2024), Ye et al. (2024), Liu, Xu and Zou (2024), and Zhang et al. (2024). On the one hand, by combining multiple data sources, CMDS, CHFS, and the China City Statistical Yearbook, we jointly document changes in migrant composition, local labour-market outcomes, and adjustments in the urban industrial structure. On the other hand, we bring two dimensions that gender and education are crucial in both theory and practice explicitly into the analytical framework from the outset and systematically compare the response patterns of local workers across different gender-education groups. Third, on the mechanism side, we propose a supply-side-demand-side explanatory framework based on indirect evidence from three layers: job stability, household consumption of domestic services, and sectoral employment structure. This framework helps explain why, in our setting, low-skilled migrant inflow does not generate a clear net displacement effect on low-educated local women but instead coincides with improvements in their labour-market outcomes. It should be emphasised that, due to the lack of task-level and firm-level data, this explanation remains to some extent exploratory, and future work will need to test it further when finer-grained data become available.

The remainder of the paper is structured as follows. Section 2 sets out the institutional background of China's hukou system and internal migration, reviews the related literature, and positions the present study within the strands on gender- and education (skill)-specific labour-market effects of migration, highlighting our main contributions. Section 3 describes the data sources, details the sample construction, and presents the DID identification strategy. Section 4 reports the core empirical findings and heterogeneity patterns: it first documents the impact of the 2014 hukou reform on the composition of internal migrants at the city level and then examines labour-market responses among urban local registered residents in the full sample, by gender, by education, and along the intersection of gender and education. Section 5 investigates potential mechanisms along both the supply and demand sides. On the supply side, it uses information on occupational stability and household service expenditure to explore adjustment channels for local residents, especially low-educated women, while on the demand side, it combines macroeconomic indicators with sectoral skill intensity and sectoral gender composition to assess the expansion of labour demand and its distribution across industries in small and medium-sized cities.

Section 6 concludes by summarising the main findings, discussing their implications for China's hukou reform and inclusive urbanisation, and outlining limitations and avenues for future research.

2 Institutional Background and Related Literature

2.1 China's Hukou System and the 2014 Reform

After the founding of the People's Republic of China, the state gradually established a population management system based on household registration. In January 1958, the Standing Committee of the National People's Congress adopted and promulgated the Household Registration Regulations of the People's Republic of China, which standardised household registration nationwide and is widely regarded as marking the formation of the modern hukou system. The Regulations set up an institutional framework distinguishing residents by agricultural and non-agricultural hukou status, dividing the population into two broad categories, agricultural (rural) and non-agricultural (urban), and thereby laying the foundation for subsequent resource allocation and migration management (Chan, 1999; Wu and Treiman, 2004). Cheng and Selden (1994) note that since the 1950s, this system has been systematically used to restrict rural-urban migration. Through the control of quotas for converting agricultural to non-agricultural hukou and stringent approval procedures, rural and urban residents were institutionally separated.

Subsequent research further reveals the close link between the hukou system and resource allocation. Wu and Treiman (2004) argue that during the planned-economy period, hukou status was one of the most important determinants of differentiated privileges, directly shaping access to desirable jobs, children's educational opportunities, urban housing, health care, and eligibility to move into cities. Drawing on intergenerational mobility, Wu (2007) finds that the agricultural/non-agricultural distinction largely determined whether a family could enter the formal urban sector, thereby shaping patterns of intergenerational occupational mobility. From the perspective of urbanisation and migration, Chan (2009, 2010) emphasises that for a long time the hukou system effectively created a two-tier citizenship structure: urban hukou holders enjoyed relatively comprehensive urban welfare, while a large number of rural-hukou workers who migrated to cities for employment and residence found it difficult to obtain local urban hukou and the associated social security.

Following the reform and opening-up, the development of township and village enterprises and rapid industrialisation in coastal regions triggered large-scale flows of rural migrant workers towards coastal and large and medium-sized cities, concentrated in labour-intensive sectors such as manufacturing, construction, and low-skilled services. Studies by Cheng and Selden (1994) and Chan (1999, 2010) show that, although administrative prohibitions on migration were gradually relaxed and population mobility rose rapidly, the hukou system continued to control urban hukou quotas and the welfare entitlements attached to hukou. As a result, most rural migrants working in cities were locked into a status combination of rural hukou and urban employment and thus occupied an institutionally disadvantaged position with respect to education, social security, and housing.

Since the beginning of the twenty-first century, both central and local governments have begun to experiment with gradual reform of the hukou system. Some large and medium-sized cities opened urban hukou to highly educated and highly skilled workers through talent-attraction programs and points-based settlement schemes. Zhong's (2015) policy review documents that the decision at the Third Plenary Session of the 18th Central Committee in 2013

explicitly articulated the principle of fully lifting hukou restrictions in established towns and small cities, gradually relaxing settlement requirements in medium-sized cities, appropriately determining settlement conditions in large cities, and strictly controlling population growth in megacities.

Along this reform trajectory, the State Council's Opinions on Further Promoting the Reform of the Household Registration System, issued in 2014, is widely regarded as the programmatic document for a new round of nationwide hukou reform. These Opinions introduced a tiered management of hukou migration policy based on the resident population in urban built-up areas. First, for established towns and small cities (corresponding to urban resident populations below 0.5 million), settlement restrictions were fully lifted: conditional on having lawful and stable housing (including rental accommodation), eligible agricultural transfer population and their family members could obtain urban hukou in a relatively convenient manner. Second, for medium-sized cities (those with urban populations of 0.5-1 million), settlement requirements were gradually relaxed, typically requiring lawful and stable employment, lawful and stable housing, and social security contributions for a certain number of years. Third, for large cities with urban populations of 1-3 million and 3-5 million, settlement scales and pace were to be appropriately controlled, under reasonably defined conditions, by allowing higher thresholds for employment, housing, and contribution years, or by establishing points-based hukou admission schemes. Fourth, for megacities with urban populations above 5 million, the document explicitly stressed strict control of population size, mainly through points-based settlement, aggregate quotas, and rank-order admission, thereby maintaining high entry barriers.

Chan (2014) summarises this approach of the policy as open small cities and control big cities: nationwide, the aim is to encourage migrants with stable employment and residence to transfer hukou to small and medium-sized cities, while maintaining high admission thresholds in megacities. In contrast to earlier reforms that primarily opened urban hukou through talent-attraction channels targeting highly educated, high-skilled workers, this round of reform paid greater institutional attention to ordinary migrants, especially those from rural areas with relatively low educational attainment. Zhong (2015) points out that the Opinions explicitly emphasise guiding agricultural transfer population to move to cities and towns in an orderly manner and to be incorporated as urban residents, and that the relaxation of settlement thresholds in small and some medium-sized cities provides this group with a much clearer institutionalised pathway to urban hukou acquisition.

This institutional design is closely related to the research question of this paper. On the one hand, for local registered residents who held urban hukou and had long resided in the locality before the reform, the 2014 reform neither directly altered their hukou status nor reduced their existing urban welfare entitlements. The policy documents clearly identify agricultural transfer population and other non-registered permanent residents, rather than existing urban hukou holders, as the primary targets of urbanisation and citizenisation. This implies that, institutionally, the direct impact of the reform on local urban hukou holders is limited. Its main effects are more likely to operate through changing the spatial distribution and settlement decisions of low-skilled, low-educated migrants across cities of different tiers, and thereby indirectly influencing the labour-market outcomes of local registered residents via labour supply and labour demand channels.

On the other hand, because the policy classifies cities into several tiers according to the size of the urban resident population and assigns systematically different settlement conditions and degrees of relaxation across tiers, they provide empirical research with a relatively clear exogenous institutional variation stemming from a unified central-government document. In this paper, we follow this population-based classification and treat megacities

with urban resident populations above 5 million, where strict settlement controls continued to be enforced after the reform, as the control group. The remaining cities are divided, in descending order of size, into four treatment groups: Type I large cities with populations of 3-5 million, large cities with populations of 1-3 million, medium-sized cities with populations of 0.5-1 million, and small cities and established towns with populations below 0.5 million. Against this institutional background, we view the 2014 hukou reform as a policy shock that primarily operates through changing migrants' hukou acquisition opportunities and the relative attractiveness of cities, while imposing only limited direct institutional constraints on local hukou holders. We then exploit cross-group variation in reform intensity by city size to identify the causal impact of internal migrant composition changes on the labour-market outcomes of local urban hukou residents.

2.2 Internal Migrants, Skill Composition, and Urban Local Hukou Holders in China's Labour Market

Since the start of the reform and opening-up period, China has experienced massive rural-urban population movements and has formed a sizeable internal migrant labour force whose mobility is predominantly employment-driven. According to the National Bureau of Statistics (NBS), the Statistical Bulletin on National Economic and Social Development[4] in 2014 reports that the total number of rural migrant workers in 2014 was 274 million, of whom approximately 168 million were migrant workers working away from their registered home areas and about 106 million were local migrant workers. These figures indicate that rural migrant labour accounts for a substantial share of the urban employed population. Based on a comprehensive analysis of the NBS migrant worker monitoring surveys, Lu (2016) argues that, since the 1990s, large numbers of rural workers have flowed into coastal and central-eastern cities, and that internal migration has become the key demographic foundation underpinning China's rapid industrialisation and urbanisation. Against this backdrop, any institutional adjustment that alters settlement opportunities for migrants has the potential to affect urban local labour markets through labour supply channels.

From the perspective of human capital composition, official monitoring and academic studies consistently show that, relative to urban local hukou labour, China's rural migrant workers / internal migrants are, on average, less educated. The 2014 National Migrant Worker Monitoring Survey Report[5] summarises that the education level of migrant workers is concentrated at the middle-school level, with a relatively small share having completed upper high-school education or above, and that their educational structure differs markedly from that of urban hukou labour. Earlier nationwide migrant worker surveys (Development Research Centre of the State Council Research Team, 2006) and the 2012 Migrant Worker Monitoring data[6] likewise indicate that junior secondary schooling and below have long accounted for most of the migrant workers' educational attainment, whereas the proportion with college education and above is significantly lower than among urban hukou workers.

Against this background, existing research finds that higher education substantially increases individuals' probability of interprovincial and long-distance migration (Ding, 2021). At the same time, under the prevailing hukou framework, talent-attraction and points-based settlement policies implemented by local governments typically treat educational attainment and professional skills as key admission criteria, thereby offering relatively smoother settlement channels to highly educated groups (Song, 2014). Consequently, before the 2014 hukou reform, institutional hukou entry thresholds in practice imposed more direct constraints on rural migrants with lower education levels, whereas highly educated groups could, to a considerable extent, circumvent some institutional

[4] https://www.stats.gov.cn/sj/zxfb/202302/t20230203_1898704.html
[5] https://www.stats.gov.cn/sj/zxfb/202302/t20230203_1898768.html
[6] https://www.stats.gov.cn/sj/zxfb/202302/t20230203_1898305.html

barriers by leveraging their educational and skill advantages. Given this institutional context, treating the 2014 hukou reform as an institutional shock that lowers hukou entry thresholds for low-educated migrants has a clear empirical basis.

Consistent with this educational structure, the industrial and occupational distribution of internal migrants displays a typical concentration in low-skilled positions. Using the 2005 1% National Population Sample Survey, Zhang and Wu (2017) systematically compare the occupational structure of rural-hukou migrants and local hukou workers in cities. They show that the former are heavily concentrated in manufacturing, construction, wholesale and retail, hotels and catering, and personal and household services, and are predominantly employed as machine operators, manual labourers, and elementary service workers in low-skilled jobs. By contrast, local hukou workers are more likely to be employed in government agencies, public institutions, state-owned enterprises, and professional and managerial positions. A core conclusion of their study is that, after controlling for education and other human capital factors, the income disadvantage of rural migrants relative to local workers largely stems from occupational segregation along hukou lines. This evidence is consistent with the description of migrant workers' educational attainment: in urban labour markets, migrants and local hukou residents differ systematically not only in education levels, but also in industry and job allocation, forming relatively segmented employment segments.

Within the population of urban local hukou workers, gender and education (as an observable proxy for skill) further shape the structure of labour-market inequality. Empirical work on gender differences shows that even within the urban formal labour market, women remain in a relatively disadvantaged position in terms of labour-force participation and earnings. Based on multiple waves of official statistics and survey data, Wang and Klugman (2020) document that, since the 1990s, female labour-force participation in China has exhibited a downward trend, gender wage gaps have tended to widen in several periods, and women are more likely to be concentrated in lower-paid, service-type and clerical positions with limited promotion prospects. At the level of intra-household division of labour, Dong and An (2015), using the 2008 China Time Use Survey, find that urban married women devote significantly more time to unpaid housework and care work than men; even after controlling for age, education, income, and other characteristics, women's total working time (paid plus unpaid) remains significantly higher than that of men. Qi and Dong (2016) further show that unpaid care work systematically interferes with women's paid working hours and earnings and constitutes an important mechanism underpinning urban gender income gaps. Taken together, these studies indicate that, even when analysis is restricted to urban hukou holders, women's labour supply, both in terms of quantity and quality, remains constrained by the combined effects of household responsibilities and institutional arrangements.

The education (or skill) dimension reveals another layer of stratification among urban local workers. Using national population sample surveys and labour-force survey data, Fu and Ren (2010) and related studies find that, under the segmentation created by the hukou system, returns to education are generally high for urban hukou residents, whereas educational returns for rural hukou residents are significantly lower, suggesting that education amplifies differences across hukou groups. Combining this with Zhang and Wu's (2017) evidence on occupational segregation, one can see that, within cities, highly educated local hukou workers are more likely to enter the formal sector and professional and technical positions with higher wages and greater employment stability, whereas low-educated local hukou workers are more concentrated in general manufacturing, construction, and low-end services, and occupy a clearly disadvantaged position in terms of wages, career advancement, and job stability. When this education-based occupational stratification is superimposed on the gender differences, low-educated urban women often face multiple constraints simultaneously, insufficient human capital, limited occupational

opportunities, and heavy housework and care burdens, and thus occupy a particularly vulnerable position in urban labour markets.

In summary, official statistics and the existing literature jointly portray the following background. On the one hand, around 2014, China's internal migrant population was very large, had relatively low average educational attainment, and was heavily concentrated in labour-intensive industries and low-skilled jobs. On the other hand, within the urban local hukou labour force, there exist pronounced inequalities along the gender and education dimensions, with low-educated women subject to a dual set of constraints from both the labour market and intra-household division of labour. Combining these two sets of facts, it is clear that when the 2014 hukou reform lowered settlement thresholds in small and medium-sized cities, especially by providing more opportunities for less-educated migrants to settle locally and enter the formal urban labour market, the resulting effects on urban local registered residents are likely to exhibit strong heterogeneity along the gender and education dimensions. Against this institutional and structural backdrop, the subsequent empirical analysis in this paper proceeds in two directions: using CMDS data, we characterise changes in the inflow of low-educated migrants across different city groups; and using CHFS data, we focus on the responses of urban local registered residents, particularly low-educated women, in terms of employment, working hours, and wages. In doing so, we concretise the discussion linking internal migration, skill composition, and local labour markets into an empirically identifiable causal analysis.

2.3 Existing Studies Using the 2014 Hukou Reform as a Quasi-Natural Experiment

In recent years, the State Council's Opinions on Further Promoting the Reform of the Household Registration System (2014) has gradually become an important quasi-natural experiment for studying internal migration and urban development in China. The document explicitly stipulates that cities are to be categorised according to the size of their resident population: megacities with urban populations above 5 million are required to strictly control the scale of hukou settlement; cities with populations of 3-5 million, 1-3 million, and 0.5-1 million are to relax settlement conditions to varying degrees in an orderly manner; and cities with populations below 0.5 million are to fully lift settlement restrictions. Based on this institutional design, a series of studies treat cities with populations above 5 million, where hukou policies remained essentially unchanged, as the control group, and regard other cities as treatment groups of differing intensity. They then construct city-year multi-intensity DID models to identify the causal effects of relaxing hukou constraints.

Existing studies have first examined the economic consequences of the 2014 hukou reform at the macro or city level. Guo and Xu (2025), using city panel data for 2003–2019 and a city-tier DID design similar to that adopted in this paper, find that the 2014 hukou reform has a significantly positive impact on urban economic growth, with effects being more pronounced in medium-sized cities. The authors discuss potential mechanisms in terms of labour agglomeration, market-size expansion, and improved allocation of human capital. Lu and Qian (2024), drawing on city-level innovation indices, patent data, and newly registered firms, show that, after controlling for city and year fixed effects and conducting a range of robustness checks, the reform is associated with an increase of roughly 20–50 percent in innovation indicators for most treated cities, and they argue that this operates through channels such as increased urban labor supply, a higher share of high-skilled workers, and improved financial and public-service environments. Liu, Xu and Zou (2024) interpret the hukou reform as an institutional shock that relaxes migration barriers and, using business registration data together with a county-level measure of reform exposure in a DID framework, find that entrepreneurship and firm entry rise significantly in reform-exposed areas,

especially in labour-intensive industries. On this basis, they argue that the reform expands labour demand while also being accompanied by increased entry of marginal firms. Taken together, these studies suggest that, at the city level, the 2014 hukou reform has promoted economic growth, innovation, and entrepreneurial activity by loosening hukou-based settlement restrictions and thereby altering labour supply and the allocation of human capital.

Another strand of the literature focuses more directly on migration and labour-market outcomes. An et al. (2024), using census and survey data and exploiting cross-city variation in hukou admission thresholds induced by the 2014 reform to construct a DID model of local labour markets, find that, after the reform, the labour earnings of pre-existing migrants declined significantly in non-megacities relative to megacities, while the wages of urban hukou holders were largely unaffected, indicating a strong segmentation between registered urban residents and migrants in Chinese urban labour markets. Ye et al. (2024), using education and household data, study the impact of hukou reform on human capital investment in migrant children and find that lowering settlement thresholds is associated with higher educational investment and longer years of schooling for these children. In terms of welfare and financial behaviour, Wu et al. (2025) treat the 2014 reform as a policy shock that relaxes internal migration constraints and, using health and subjective well-being measures as outcomes, report evidence that some health and well-being indicators improve following the reform. Xu et al. (2025), using household finance data and focusing on housing and credit behaviour, document changes in housing-related debt and financial leverage among urban households after the reform. Liu (2025), drawing on a more recent round of hukou reforms and farm household survey data, finds that, at the rural household level, the reform is associated with higher household income and asset accumulation and with improved allocation of resources between urban and rural areas. Taken as a whole, this body of work primarily examines changes in income, health, human capital, and financial behaviour among migrant workers, internal migrants more broadly, or rural residents, thereby focusing on the welfare implications of hukou reform from the perspective of the migrant side.

In addition, several studies approach the 2014 hukou reform from the perspective of factor reallocation and explore its impact on labour allocation and industrial structure. In a working paper, Gong, Hu, Jin and Yuan (2024) take the 2014 reform as a key institutional change and construct an index of reform exposure that combines pre-existing migration links with the intensity of reform in destination cities, thereby capturing the extent to which residents in different regions faced changes in settlement thresholds. They then use this measure to evaluate how relaxing internal migration restrictions affects individual migration decisions and job reallocation, providing evidence that the reform promotes cross-regional and cross-sectoral labour reallocation and improves the efficiency of resource allocation. Furthermore, Hirschl (2023), in his study, also exploits the uneven intensity with which the 2014 hukou reform was implemented across cities, treating it as a non-uniform migration policy shock. He examines the impact of the reform on the migration decisions and related labour-market outcomes of rural-hukou residents, providing complementary individual-level evidence for viewing the 2014 hukou reform as an exogenous policy change affecting incentives for internal migration.

These studies have, at the empirical level, conducted systematic tests of the parallel-trend assumption, thereby providing a methodological foundation for treating the 2014 hukou reform as a quasi-natural experiment. On the one hand, several studies adopt an event-study approach, constructing interaction dummy variables between city categories and year dummies for each year before and after the reform, and plotting the dynamic paths of treatment and control groups to test whether there are systematic trend differences prior to the reform. Liu, Xu and Zou (2024) explicitly note that, before presenting their baseline DID estimates, they first conduct an event-study test of parallel trends; their results show that pre-reform trends in firm entry are statistically indistinguishable between treated and

control cities, thus supporting the DID identification assumption. In their study of urban innovation, Lu and Qian (2024), following Ferrara et al. (2012), construct interaction terms between city categories and year dummies and conduct event-study tests. They report that, prior to the implementation of the 2014 reform, differences in innovation levels across cities of different population sizes are not statistically different from zero, thereby further validating the parallel-trend assumption. An et al. (2024) also present event-study results showing that the dynamic paths of wages and employment are broadly parallel between treated and control cities before the reform. Overall, these approaches indicate that, for a wide range of outcome variables, including firm registration, urban innovation, human capital investment, perceived fairness, health status, and labour disputes, DID or event-study frameworks constructed on the basis of city population size and the 2014 reform timing typically pass parallel-trend tests in the pre-reform period, thereby providing empirical support for treating the 2014 hukou reform as an approximately exogenous institutional shock.

Taken together, existing studies based on the 2014 hukou reform have made important contributions in three respects. First, in terms of identification strategy, most studies use city-size groupings and differences in reform intensity to construct city-year DID or event-study frameworks, verify parallel trends, and implement a series of robustness checks. This provides a direct methodological reference for this paper's use of a similar multi-intensity treatment setting. Second, in terms of research objects and outcome variables, the existing literature has mainly focused on urban economic growth, innovation, entrepreneurship, labour reallocation, and welfare changes among migrant workers and rural residents. Relatively few studies have systematically examined, from the perspective of urban local registered residents, the heterogeneous effects of internal migrant inflows on different groups in the local labour market. Although An et al. (2024) have begun to discuss the impact of the reform on the labour-market outcomes of urban local residents, their analysis of gender differences, education (skill) differences, and their interaction within the population of local hukou holders remains limited. Third, in terms of mechanism analysis, most existing studies emphasise macro-level channels such as the overall quantity and quality of labour, firm-level behaviour, and the urban innovation environment. Less attention has been paid to household-level mechanisms related to the outsourcing of housework and care and the adjustment of women's labour supply, or to changes in employment structure at the industry level, especially between skill-intensive and non-skill-intensive sectors and sectors with different gender compositions.

Against this backdrop, the perspective and contributions of this paper can be summarised as follows. First, we use the 2014 hukou reform as an exogenous shock and adopt a city-size classification consistent with that in Lu and Qian (2024) and related studies: cities with urban populations exceeding 5 million, where settlement policies remained largely unchanged, are treated as the control group, while cities with populations of 3-5 million, 1-3 million, 0.5-1 million, and below 0.5 million constitute four treatment groups of differing intensity, capturing the stepwise relaxation of settlement thresholds. Second, in terms of data, we combine the China Migrants Dynamic Survey (CMDS) with the China Household Finance Survey (CHFS), identifying changes in migrants' educational and sectoral composition at the city-year level on the one hand, and characterising labour-market outcomes of urban local registered residents at the micro household and individual level on the other. This complements most existing studies that rely on census data or city-level aggregates. Third, in terms of analytical dimensions, we treat gender and education (schooling, as a proxy for skill) as core heterogeneity dimensions from the outset of the research design, focusing specifically on the impact of low-skilled migrant inflows on the labour-market outcomes of low-educated local women. Combining evidence on job stability, household consumption of domestic services, and city-level employment structures by industry and gender composition drawn from the China City Statistical Yearbook, we conduct mechanism analysis along both supply-side and demand-side channels. Compared with the

existing literature, this three-layer perspective, linking migrant composition, the internal structure of urban local registered residents, and mechanisms, facilitates a more nuanced identification of the redistributive effects of internal migration across different groups in urban local labour markets under a common institutional shock.

2.4 Relation to the Existing Literature and Contributions of This Paper

Since the 1980s, a systematic body of literature has emerged on the relationship between international migration and local labour markets. On the one hand, classic analyses based on labour supply shocks emphasise that migration increases the supply of low-skilled labour and thereby exerts competitive pressure on the wages and employment of low-skilled native workers (Borjas, 2003). On the other hand, a large and more recent empirical literature shows that when capital, industrial structure, and technology can adjust, the average impact of immigration on natives' wages and employment is often small, and the overall effects are better characterised as a redistribution of income and employment across skill groups rather than a simple aggregate crowding-out. Using UK data, Dustmann, Frattini and Preston (2013) estimate the impact of immigration shocks at different points of the wage distribution and find that immigration mainly depresses wages at the bottom, while exerting slightly positive effects on wages of middle- and higher-earning natives. This highlights the heterogeneity and distributional consequences of immigration shocks.

Regarding heterogeneity, gender and skill (education) have gradually become key perspectives for understanding the effects of migration on local workers. A strand of work, primarily for the United States and Europe, links migration to native women's labour supply, intra-household division of labour, and the development of domestic-service markets. Exploiting cross-city differences in low-skilled immigration in the United States, Cortés and Tessada (2011) find that low-skilled migrants significantly increase the market working hours of high-skilled native women, while having limited effects on their labour-force participation. The mechanism operates through immigrants' concentration in domestic and care services that are close substitutes for household production, which lowers the relative price of such services and relaxes high-skilled women's time constraints. Studies using data from Spain and Italy reach similar conclusions. Farré, González and Ortega (2011) show that female immigration increases the local supply of domestic services and reduces their price, thereby raising the labour supply of highly educated native women. Barone and Mocetti (2011), using Italian data, likewise find that low-skilled female immigrants' concentration in household service sectors helps increase native women's working hours, especially among those with higher education. Taken together, these studies indicate that in environments with well-developed domestic-service markets and strong time constraints on women, inflows of low-skilled migrants may stimulate native women's labour supply via a housework outsourcing-time reallocation channel, rather than solely through competitive effects.

Compared with the literature on international migration, research on internal migration in China started later but has expanded rapidly in recent years. Early studies, often using census or large-scale survey data, focused on the average impact of rural migrants on the wages and employment of urban natives. For example, Meng and Zhang (2010), using the 2000 Population Census and the 2005 1% Population Sample Survey, examine how large-scale rural-urban migration affects the employment and wages of urban natives. Overall, they find that the impact of rural migrants on average urban employment and income is limited, but there is some competitive pressure among low-skilled natives. This result echoes the evidence from Europe and the United States: the average effect of immigration is modest, but effects may be more pronounced among low-skilled natives. At the same time, China's internal migration is constrained by multiple institutional factors, including the hukou system, local public service

provision, and industrial structure, and how to identify the causal effects of migration on different native groups under this institutional environment has long been a central concern of the literature.

A more recent wave of studies exploiting the 2014 hukou reform has provided a new quasi-natural experiment framework for identifying internal migration shocks and their labour-market effects. Using administrative firm registration data and cross-city variation in the intensity of the 2014 hukou reform, Liu, Xu and Zou (2024) construct a city-year difference-in-differences model and find that loosening hukou entry thresholds significantly promotes entrepreneurial activity, especially in labour-intensive industries. This suggests that the reform expanded labour demand and entrepreneurial entry by increasing the supply of low-cost labour. More directly related to this paper, Qiao and Wang (2025), using individual-level panel data from the 2011-2019 China Household Finance Survey (CHFS), likewise treat the 2014 hukou reform as an exogenous shock affecting low-skilled migration and examine the impact of low-skilled migrant inflows on urban native women's labour supply. They find that low-skilled inflows significantly increase native women's market working hours, particularly among high-wage women, while having no significant effect on labour-force participation. Their mechanism analysis shows that reform-induced low-skilled migration expanded the supply of market-based domestic services and lowered their prices, leading native women to increase their consumption of domestic services and reduce their time spent on housework.

Building on this literature, our study is closely related to, but also extends and complements, the existing work in several respects. First, whereas Qiao and Wang (2025) focus on urban native women, our unit of analysis is the entire population of urban local registered residents, on which basis we systematically examine heterogeneity along gender and education (as a proxy for skill). We not only study local women but also explicitly include local men in a unified framework, comparing how low-skilled migrant inflows affect different gender and education groups of local residents in terms of employment, working hours, and wages. This allows us to provide a more comprehensive description of the redistributive patterns in urban native labour markets under internal migration shocks. This design echoes the international literature's emphasis on heterogeneous effects across the skill distribution (e.g. Dustmann, Frattini and Preston, 2013; Borjas, 2003) but embeds the analysis in China's specific institutional context of the hukou system and internal migration.

Second, in terms of data and identification strategy, we combine multiple data sources, CMDS, CHFS, and the China City Statistical Yearbook, to examine migrant inflows and local labour-market outcomes within a coherent city-year framework. CMDS provides information on changes in the scale and composition (by gender, education, and industry) of migrants at the city level, enabling us first to verify that the 2014 hukou reform significantly altered the educational structure of the migrant population in cities, particularly by increasing the share of low-educated migrants among all migrants. We then use the urban hukou subsample of CHFS to examine how these changes affect the labour-market outcomes of local registered residents. Compared with studies that rely solely on household or individual data, this two-step design, linking changes in migrant composition to local outcomes, helps us delineate more clearly the causal chain connecting policy, migrant inflows, and native labour-market results.

Third, in the analysis of mechanisms, we explicitly consider both supply-side and demand-side channels. On the supply side, we draw on and adapt the housework outsourcing-time reallocation mechanism from the international literature by using CHFS household data on domestic-service utilisation and spending to examine whether low-skilled migrant inflows increase local households' use of domestic services and thereby influence the

labour-supply behaviour of local residents, especially women. This part of our analysis is closely aligned, in terms of mechanism, with the work of Cortés and Tessada (2011), Farré et al. (2011), and Barone and Mocetti (2011) on low-skilled migration, domestic services, and native women's labour supply, while placing the analysis in the institutional context of China's internal migration and hukou system. On the demand side, drawing on data from the China City Statistical Yearbook, we study the relationship between the 2014 hukou reform and urban economic growth, changes in industrial structure, and the composition of employment across sectors. On this basis, we distinguish between skill-intensive and non-skill-intensive industries and between industries with different gender profiles; to capture how low-skilled migrant inflows affect local employment and working hours through channels such as firm expansion and employment growth in labour-intensive sectors. This part of the analysis complements the evidence in Liu, Xu and Zou (2024), who find that the reform significantly boosts entrepreneurial activity and labour demand in labour-intensive industries, and provides macro demand-side support for understanding improvements in local workers' employment and working hours.

Finally, in terms of research focus, we place particular emphasis on low-educated local women, a group that has received relatively little attention in the existing literature. In the international literature, the impact of migration on low-skilled natives is typically assumed to be more competitive and potentially negative (e.g. Borjas, 2003; Edo and Özgüzel, 2023), and studies of internal migration in China likewise tend to treat low-skilled natives as a potentially adversely affected group. In contrast, our baseline results show that, in the specific institutional setting of the 2014 hukou reform, inflows of low-skilled migrants do not, on average, significantly crowd out employment and working hours of low-educated urban natives, particularly low-educated local women, but are instead accompanied by improvements in their labour-market outcomes. This finding is complementary, along the gender-income dimension, to Qiao and Wang's (2025) conclusion that high-wage native women benefit more, and it also suggests that in an institutional environment with pronounced sectoral segmentation and task specialisation, the relationship between migrants and natives may not be one of simple substitution, even when it appears to involve low-skill vs low-skill pairs on the surface. Given data limitations, we adopt a deliberately cautious tone throughout the paper, treating this as a plausible mechanism consistent with the available evidence rather than a fact, and we use mechanism analysis and multiple robustness check to enhance the credibility of our conclusions as far as possible.

In summary, against the backdrop of China's internal migration and hukou reform, this paper seeks to place low-skilled migrant inflows, labour-market outcomes of urban local registered residents, gender and education heterogeneity, and supply-side and demand-side mechanisms within a unified empirical framework. Relative to existing studies that utilise the 2014 hukou reform, our main incremental contributions lie in the following: on the data side, we combine CMDS, CHFS, and the China City Statistical Yearbook to construct a more complete identification chain; on the population side, we focus on urban local registered residents and their gender-education heterogeneity; and on the mechanism side, we simultaneously examine household domestic-service use and urban industrial restructuring as two complementary channels.

3 Data and Research Design

This study adopts a two-step empirical design. First, we use the China Migrants Dynamic Survey (CMDS) to characterise and identify the impact of hukou reform on the composition of migrants at the city level, with particular attention to the share of low-educated migrants. Second, based on the China Household Finance Survey

(CHFS), we construct a sample of urban local registered residents and examine how reform-induced inflows of low-skilled migrants affect local urban labour-market outcomes. Data from the China City Statistical Yearbook are used to construct city-level macro control variables and the industry and employment structure indicators needed for the mechanism analysis.

3.1 Data Sources and Sample Construction

In the first step, we use the 2011-2017 waves of CMDS. CMDS is organised and implemented by the National Health Commission. Conducted annually since 2009, it employs stratified multi-stage sampling to survey around 200,000 migrants nationwide, covering 31 provinces and the Xinjiang Production and Construction Corps. It is one of the most authoritative and nationally representative large-scale annual surveys of migrants in China (Wang, Wang and Qi, 2021; Okubo et al., 2019). Although CMDS is cross-sectional and does not track individuals over time, its repeated coverage across years and regions allows researchers to construct dynamic indicators of migrant composition at the city-year level and use them to identify how institutional changes affect the scale and characteristics of urban migrants. Several existing studies have adopted similar approaches when examining the impact of relaxing internal migration restrictions on local labour markets and public service provision (An et al., 2024; Lu, 2023).

We restrict the CMDS sample to migrants aged 16-65. Using individual information on migrants, we construct several city-year level indicators of migrant composition, including the age structure of migrants, the gender composition, the share of low-educated migrants, and the employment shares across industries (in particular, the share employed in service sectors dominated by low-skilled jobs). In the first step, these variables serve as outcome variables to test whether the 2014 hukou reform systematically altered the educational and industrial structure of migrants received by different city groups. Definitions of the main variables in the CMDS sample and their mean differences before and after the reform between treatment and control groups are reported in Appendix Table A1.

In the second step, we use five waves of CHFS data (2011, 2013, 2015, 2017, and 2019). CHFS is organised by the Survey and Research Center for China Household Finance at Southwestern University of Finance and Economics. It adopts a multistage, stratified, and clustered sampling design with probability proportional to size to draw nationally representative household and individual samples that cover both urban and rural areas. The data have been widely used in research on wealth distribution, income composition, and labour markets (Yang, Wu and Huang, 2020; Hung, 2022).

To focus on the labour-market responses of urban local residents, we restrict the CHFS sample to individuals aged 16-65 who currently hold an urban hukou and reside in the corresponding city, that is, urban local registered residents. This definition is consistent with existing CHFS-based studies of urban local labour markets and the hukou system. For example, Zhang et al. (2024), when analysing the impact of hukou reform on labour-market outcomes of urban locals, treat individuals who hold an urban hukou in their city of residence and live there as urban natives. More broadly, defining individuals who both hold a local urban hukou and reside in the corresponding city as urban locals or urban native workers is also common in the literature on wage gaps between local and migrant workers under the hukou system (Ma, Li and Iwasaki, 2024; Guo et al., 2025; Hu and Jia, 2025; Fukui and Nakamura, 2025). Therefore, although this definition does not perfectly distinguish, in all years, those who were born with local hukou from those who migrated earlier and subsequently obtained local hukou, this group is typically regarded in Chinese urban labour-market research as the main participants in the formal urban

labour market.

It is worth noting that the 2019 wave of CHFS includes additional questions on whether respondents have ever changed their hukou registration and, if so, when. This provides useful information for assessing the extent to which the sample may include individuals who migrated earlier and completed hukou transfer. According to our summary of the 2019 sample, among urban local registered residents who provided valid answers to these questions (about 62%), around 13% reported having migrated their hukou in the past, about 48% reported never having changed their hukou, and the remaining 38% have missing values on this question. This indicates that our study sample may indeed contain a subset of individuals who migrated to cities and completed hukou transfer in earlier periods. Similarly, Zhang et al. (2020), using hukou migration information in the 2017 CHFS to study return migration and hukou constraints, also emphasise that CHFS has unique advantages in recording hukou migration histories, although it still has certain limitations in capturing all migration events.

Considering existing practices in the literature and the descriptive statistics above, we continue, in our main sample definition, to treat individuals aged 16-65 who currently hold an urban hukou and reside in the city as urban local registered residents. To assess whether potential contamination affects our conclusions, we conduct robustness checks using the 2019 CHFS, restricting the sample to individuals who provide valid answers to the hukou migration question and report never having changed their hukou, and re-estimate our models on this subsample. The results are consistent with the baseline findings in terms of both sign and statistical significance; the corresponding tables are reported in the Appendix (Tables A5-A9). This exercise suggests that the small share of earlier migrants who subsequently obtained local hukou in our main sample is unlikely to drive our main findings.

In CHFS, we choose three core labour-market outcome indicators as dependent variables. The first is a binary indicator for whether the individual is employed, used to measure labour-force participation. The second is daily working hours, reflecting the intensity of labour supply. The third is the logarithm of post-tax monthly labour income, capturing the level of labour earnings. For control variables, we use individual characteristics provided by CHFS to construct the vector X_{ict}, including gender, age, marital status, years of schooling or educational attainment, the number of children in the household, and the number of elderly household members. These variables help improve estimation precision and provide the basis for the subsequent heterogeneity analyses by gender and education. Descriptive statistics for key variables of urban local registered residents before and after the reform and across city groups are reported in Appendix Table A2.

The third dataset is the China City Statistical Yearbook for 2000-2019. The yearbook provides city-level macroeconomic and industrial structure indicators, including each city's GDP, the share of value added in the tertiary sector, and employment by industry. We use city-level GDP and the share of the tertiary sector in GDP in the pre-reform period to construct the vector of baseline city characteristics Z_{ct_pre}. In the regressions, these variables enter as time-invariant controls and interact with a linear time trend to absorb potential heterogeneous trends across cities with different initial development levels. In the mechanism analysis, we further use information on employment by industry to study changes in employment scale in non-skill-intensive industries and in industries with high female employment shares. Matching CMDS or CHFS with the China City Statistical Yearbook in this way is also common in recent work on hukou reform and labour markets (An et al., 2024; Yi and Li, 2025).

3.2 Treatment Variables and Policy Timing

The 2014 hukou reform implemented differentiated settlement policies according to the size of the resident population in each city. Following the policy document, we classify cities into one control group and four treatment groups. Cities with resident populations exceeding 5 million serve as the control group, as settlement conditions were not relaxed there. Cities with populations of 3-5 million, 1-3 million, 0.5-1 million, and below 0.5 million form four treatment groups, where smaller cities generally experienced larger reductions in settlement thresholds, and the smallest cities (below 0.5 million) essentially achieved full liberalisation. This grouping of cities by population size to capture policy intensity is consistent with recent studies on local labour markets, firm behaviour, and entrepreneurial responses to the 2014 hukou reform (An et al., 2024; Liu, Xu and Zou, 2024; Zhang et al., 2024). Let $TreatGroup_{cj}$ denotes a dummy variable indicating that city c belongs to treatment group j (j=1, …,4), cities in the control group thus have $TreatGroup_{cj}$=0.

The timing of the reform is captured by the time dummy $Post_t$. For both the CMDS and CHFS datasets, survey years before 2014 are treated as the pre-reform period ($Post_t$=0), and survey years after 2014 as the post-reform period ($Post_t$=1). The interaction term $TreatGroup_{cj} \times Post_t$ constitutes the key treatment variable in the multi-intensity DID design, reflecting the differential changes, after versus before the reform and relative to control cities, in outcomes for cities belonging to different population-size groups.

3.3 City-Level Controls and Time Trend Specification

To account for systematic differences in economic development and industrial structure across cities before the reform, we construct a vector of pre-reform city characteristics Z_{ct_pre} using data from the China City Statistical Yearbook for the year 2013. Specifically, Z_{ct_pre} includes the log of city GDP and the log of the share of tertiary-industry value added in GDP, among other pre-period indicators. Rather than controlling for contemporaneous or lagged city-level macro variables in all years, which would risk conditioning on outcomes that are themselves partly driven by the hukou reform and thus introduce bad controls, we restrict attention to pre-reform baseline characteristics to capture structural differences across cities without absorbing policy-induced variation.

We then construct a common linear time trend T_t and include the interaction term $Z_{ct_pre} \times T_t$. in all regressions. This specification allows cities with different initial levels of economic development and industrial structure to follow distinct linear trends, thereby mitigating potential bias arising from the correlation between baseline city characteristics and time trends. As a result, the estimated treatment effects can be more plausibly interpreted as the net impact of the hukou reform after controlling for heterogeneous city-specific trends.

Using interactions between pre-treatment baseline characteristics and time trends in regional or city-level difference-in-differences settings is consistent with existing empirical practice. For example, Autor, Dorn and Hanson (2013) exploit interactions between initial industry structure and time trends to absorb heterogeneous trends across local labour markets with different initial exposure to Chinese import competition. And Dell and Olken (2020) similarly allow countries with different initial conditions to follow differential growth paths when studying the effects of leadership transitions on economic performance. Our use of $Z_{ct_pre} \times T_t$. follows the same econometric logic in a city-level context, focusing on pre-reform economic scale and industrial composition to more cleanly identify the causal effect of the hukou reform after controlling for baseline differences and heterogeneous trends across cities.

3.4 Identification Strategy I: Baseline Regressions for Migrant Composition (CMDS)

We use the CMDS data to examine the effects of hukou reform on the composition of migrants at the city level. Let Y_{ict} denotes the characteristic of migrant i in city c and year t, such as age, a dummy for being female, a dummy for being low-educated, or a dummy for being employed in the service sector. The baseline first-stage specification is:

$$Y_{ict} = \beta_0 + \sum_{j=1}^{4} \beta_j \left(TreatGroup_{cj} \times Post_t\right) + Z_{ct^{pre}}\delta_1 + \left(Z_{ct_{pre}} \times T_t\right)\delta_2 + \mu_c + \lambda_t + \varepsilon_{ict} \quad (1)$$

Here, μ_c denotes city fixed effects, capturing time-invariant city characteristics; λ_t denotes year fixed effects, absorbing nationwide macro shocks and common policy changes; and ε_{ict} is the error term. The coefficients β_j measure the change in the conditional mean of migrant characteristic Y_{ict} in treatment-group cities relative to control cities after the reform, i.e. the impact of the reform on migrant composition in city group j.

3.5 Identification Strategy II: Labour-Market Outcomes of Local Registered Residents (CHFS)

Using the CHFS sample of urban local registered residents, we next examine how the reform and the induced inflow of low-skilled migrants affect local labour-market outcomes. Let Y_{ict} denotes the labour-market outcome of individual i in city c and year t, namely, including (i) a dummy for having a job (an indicator of current employment), (ii) daily working hours, and (iii) the logarithm of post-tax monthly wages. Our baseline regression model is:

$$Y_{ict} = \alpha_0 + \sum_{j=1}^{4} \alpha_j \left(TreatGroup_{cj} \times Post_t\right) + X_{ict}\gamma + Z_{ct_pre}\,\theta_1 + (Z_{ct_pre} \times T_t)\theta_2 + \mu_c + \lambda_t + \varepsilon_{ict} \quad (2)$$

Here, X_{ict} is the vector of individual-level control variables, including gender, age, marital status, years of schooling or education level, the number of children in the household, and the number of elderly household

members. The definitions of Z_{ct_pre}, T_t, μ_c, and λ_t are identical to those in the first specification. The parameters α_j are the coefficients of primary interest. They capture, conditional on individual characteristics, baseline city characteristics and their time trends, the changes in labour-market outcomes of urban local registered residents in treatment-group cities after the reform relative to before the reform and relative to control cities.

3.6 Heterogeneity by Gender and Education

Given that both theory and existing empirical work suggest substantial heterogeneity in migration shocks along gender and skill (education) dimensions, we build on equation (2) to systematically examine differential responses across gender and education groups. Specifically, we estimate equation (2) separately for different subsamples while keeping the model specification unchanged. First, we split the sample of urban local registered residents by gender into male and female subsamples and estimate α_j separately for each, to compare men's and women's responses in terms of employment, working hours, and wages. Second, we divide the sample into high-education and low-education groups according to years of schooling or educational attainment and again estimate the baseline regression separately to identify differences in response intensity across education groups. Finally, we construct four subsamples defined by the intersection of gender and education (high-educated men, high-educated women, low-educated men, and low-educated women) and focus on whether low-educated women exhibit the most pronounced changes in the various labour-market outcomes. Similar heterogeneity designs along gender and skill dimensions are common in the literature on the effects of internal migration and the hukou system on local residents' labour-market outcomes (e.g. Guo et al., 2024; Huang and Zhu, 2020).

In all regressions, we include city fixed effects and year fixed effects, and cluster standard errors at the city level to account for within-city correlation of individual observations both over time and across individuals. Through this two-step design and the heterogeneity analysis by gender and education, we can provide a systematic depiction of how hukou-reform-induced inflows of low-skilled migrants differentially affect labour-market outcomes of urban local registered residents across cities and across groups defined by gender and education.

4 Empirical Results

4.1 Effects of Hukou Reform on Migrant Composition

In this subsection, we use estimates based on CMDS to examine whether the 2014 hukou reform altered the composition of migrants received by cities. Table 1 reports regression results from equation (1), where the dependent variables are, in turn, a dummy for being male, age, marital status, a dummy for being low-educated, and a dummy for working in low-skilled service sectors. The four coefficients on $TreatGroup_{cj} \times Post_t$ capture the post-reform differential changes in these characteristics in each treatment-city group relative to the control group. All specifications control for pre-reform baseline city-level macro characteristics, city fixed effects, year fixed effects, and the interaction between baseline city characteristics and the time trend.

First, columns (1)-(3) show that, for gender, age, and marital status, the post-reform coefficients for the four treatment groups are small in magnitude and statistically insignificant. This indicates that, conditional on city fixed effects and macro trends, the hukou reform did not systematically change the gender, age, or marital composition of migrants attracted to different city groups. Second, focusing on the low-education column, we observe that the share of low-educated migrants rises by about 2.7, 2.8, and 3.1 percentage points in the 1-3 million, 0.5-1 million, and below-0.5-million population groups, respectively. The coefficients for the 1-3 million and below-0.5-million groups are statistically significant at the 5% level, and the coefficient for the 0.5-1 million group is significant at the 10% level; the coefficient for the 3-5 million group is positive but not statistically significant. Overall, these results indicate that, excluding megacities, small and medium-sized cities experienced a clear tilt in the educational structure of incoming migrants towards low-educated groups after settlement thresholds were relaxed, with changes being particularly pronounced in medium-sized and smaller cities. This pattern is consistent with Zhou and Hui's (2022) census-based finding that, under the hukou regime, cross-regional migration and hukou acquisition are strongly selective in terms of education and human capital: highly educated individuals are more likely to overcome institutional barriers, whereas low-educated individuals face tighter constraints.

Finally, the estimates for employment in low-skilled service sectors further illuminate how the reform affected the sectoral composition of migrants. In column (5), all four coefficients on $TreatGroup_{cj} \times Post_t$ are positive and statistically significant at the 1% level, with magnitudes of 0.0522, 0.0385, 0.0540, and 0.0674, respectively. This implies that, relative to control cities, the share of migrants working in low-skilled service sectors increased significantly in treatment cities after the reform, with the largest increase of about 6.7 percentage points observed in cities with populations below 0.5 million and increases of roughly 5 percentage points in the 0.5-1 million and 3-5 million groups. Taken together with the rise in the share of low-educated migrants discussed above, these findings suggest that the hukou reform not only relaxed institutional constraints on low-educated migrants settling in small and medium-sized cities, but also that a substantial proportion of these additional migrants entered low-skilled service jobs, such as catering, retail and domestic services. This is consistent with existing evidence that low-skilled migrants are disproportionately employed in service sectors and household-substitution jobs (Cortés and Tessada, 2011; Peri and Sparber, 2009) and aligns with recent descriptive evidence on internal migrants in China, which shows that rural migrant workers are mainly employed in low-skilled, labour-intensive industries (Bertrand et al., 2025).

In sum, the results in Table 1 provide the key foundation for our subsequent analysis of local labour-market responses: following the reform, small and medium-sized cities, except for megacities, did indeed receive more migrants who are less educated and disproportionately employed in low-skilled service occupations.

Table 1: Impact of the Hukou Reform on the Composition of Migrants

	Male	Age	Married	Low Education	Low-skilled Service
	(1)	(2)	(3)	(4)	(5)
Treat (3-5 million) *Post	0.0004	0.3793	0.0216	0.0190	0.0522***
	(0.0133)	(0.3816)	(0.0289)	(0.0133)	(0.0165)
Treat (1-3 million) *Post	0.0227	0.2802	0.0104	0.0272**	0.0385***
	(0.0153)	(0.3691)	(0.0184)	(0.0126)	(0.0120)
Treat (0.5-1 million) *Post	0.0062	0.4124	0.0124	0.0278*	0.0540***
	(0.0139)	(0.4041)	(0.0195)	(0.0154)	(0.0164)
Treat (<0.5 million) *Post	0.0061	0.3451	0.0175	0.0305**	0.0674***
	(0.0167)	(0.4520)	(0.0242)	(0.0145)	(0.0168)
City_control	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
City_control * Time trend	Yes	Yes	Yes	Yes	Yes
N	711,809	711,809	711,809	711,809	711,809
R^2	0.0091	0.0323	0.0439	0.0462	0.0988

NOTE. —This table reports estimates of equation (1) using the 2011-2017 China Migrants Dynamic Survey (CMDS). The dependent variables are indicated at the top of each column: a dummy for male (column 1), age in years (2), a dummy for being married (3), a dummy for low education that equals 1 if the education level is high school or below (4), and a dummy for being employed in low-skilled service occupations (5). "Treat (3-5 million) *Post", "Treat (1-3 million) *Post", "Treat (0.5-1 million) *Post", and "Treat (<0.5 million) *Post" are interaction terms between city-size treatment groups and the post-reform period; the omitted category is cities with population above 5 million. All regressions include baseline city-level controls (log GDP and log of the tertiary sector's share in GDP), city fixed effects, year fixed effects, and interactions between baseline city controls and a linear time trend. Standard errors clustered at the city level are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

4.2 Baseline Effects on All Local Registered Residents (CHFS, Full Sample)

In this subsection, we use the full CHFS sample of urban local registered residents to examine the average impact of the hukou reform on local labour-market outcomes. Table 2 reports estimates of equation (2), where the dependent variables are, in turn, a dummy for having a job, daily working hours, and the logarithm of post-tax monthly wages. The interaction terms $TreatGroup_{cj} \times Post_t$ for the four treatment groups capture, conditional on individual characteristics, baseline city characteristics and their time trends, city fixed effects, and year fixed effects, how labour-market outcomes of urban local registered residents in each population-size group changed after the reform relative to those in control cities.

For employment probabilities, all four coefficients on $TreatGroup_{cj} \times Post_t$ are positive. The coefficients for the 3-5 million, 1-3 million, 0.5-1 million, and below-0.5-million population groups are 0.0071, 0.0214, 0.0325, and 0.0308, respectively, corresponding to increases in employment rates of about 0.7, 2.1, 3.3, and 3.1 percentage points. Except for the 3-5 million group, which is significant at the 10% level, the other three groups are significant

at the 1% level. The magnitude of the coefficients increases as city size decreases, indicating that in cities where hukou thresholds were relaxed more, the employment probabilities of urban local registered residents rose more markedly, with particularly pronounced employment expansion in small and medium-sized cities after the reform. This pattern is broadly consistent with the direction of findings in related studies that use the 2014 hukou reform to identify labor-market effects (Zhang et al., 2024).

The effects on working hours are larger in magnitude and more pronounced in terms of statistical significance. Column (2) shows that the coefficient for the 3-5 million group is 0.1815 and significant at the 5% level, while the coefficients for the 1-3 million, 0.5-1 million, and below-0.5-million groups are 0.2979, 0.5460, and 0.6154, all significant at the 1% level. Under the usual linear interpretation, this implies that, relative to control cities, daily working hours of urban local registered residents in treatment cities increased on average by about 0.18-0.62 hours, with the increase becoming larger as city size decreases. Combined with the CMDS results in the previous subsection, which showed that, after the reform, small and medium-sized cities attracted more low-educated migrants employed in low-skilled service sectors. These findings suggest that, against the backdrop of rising low-skilled migration, urban local registered residents did not reduce their labour supply; instead, both their employment probabilities and working hours increased substantially. This pattern is consistent with parts of the international literature documenting that low-skilled immigration can raise native labour supply through sectoral expansion and task reallocation (Peri and Sparber, 2009).

The wage results are broadly consistent with the employment and working-hours patterns but display stronger selectivity across city groups. Column (3) shows that the wage coefficients for the 3-5 million and 1-3 million groups are 0.0595 and 0.0533, respectively, which are positive but not statistically significant. By contrast, the coefficients for the 0.5-1 million and below-0.5-million groups are 0.1225 and 0.1421, both significant at the 5% level. In other words, significant wage gains are concentrated in medium-sized and smaller cities; in large and very large cities, the coefficients are positive but not statistically distinguishable from zero. Given that the dependent variable is in logarithms, the estimates of around 0.12-0.14 imply that, after the reform, average wage levels of urban local registered residents in small and medium-sized cities rose by on the order of a low double-digit percentage. This result is in line with studies that identify wage effects of hukou reform or relaxation of residence-permit systems for urban hukou holders, which suggest that in small and medium-sized cities, where labour-demand constraints are relatively less binding, relaxing mobility restrictions may significantly raise wages through industrial expansion and improved labour matching, whereas average wage effects in megacities are more limited (Zhang et al., 2024).

Taken together, Table 2 indicates that, on average, the hukou reform is strongly associated with higher employment probabilities and longer working hours among urban local registered residents, and with moderate increases in post-tax monthly wages in medium-sized and small cities where settlement thresholds were relaxed more. This yields an overall picture of post-reform urban local labour markets: labour supply and labour earnings of urban local registered residents display a structural pattern in which employment and working hours increase broadly across city groups, while wage improvements are more pronounced in selected groups of cities. However, these full-sample results do not imply that all groups are affected homogeneously. As discussed in the theoretical framework and literature review, gender and education play pivotal roles in mediating migration shocks: low-educated versus highly educated locals, and women versus men, may face systematically different occupational opportunities, household divisions of labour, and constraints. Motivated by this consideration, the next subsection further splits the sample of urban local registered residents along the gender and education dimensions

and estimates policy effects for each subsample, to characterise who adjusts and who is more strongly affected in the wave of low-skilled migrant inflows triggered by hukou reform.

Table 2: Impact of the Hukou Reform on Labour Market Outcomes of Urban Local Registered Residents

	(1)	(2)	(3)
	Job	Work hours	Log (Wage)
Treat (3-5 million) *Post	0.0071*	0.1815**	0.0595
	(0.0039)	(0.0901)	(0.0543)
Treat (1-3 million) *Post	0.0214***	0.2979***	0.0533
	(0.0050)	(0.0949)	(0.0517)
Treat (0.5-1 million) *Post	0.0325***	0.5460***	0.1225**
	(0.0071)	(0.1373)	(0.0550)
Treat (<0.5 million) *Post	0.0308***	0.6154***	0.1421**
	(0.0074)	(0.1386)	(0.0603)
Individual-level controls	Yes	Yes	Yes
City-level controls(pre-policy)	Yes	Yes	Yes
City-level controls * Time trend	Yes	Yes	Yes
City FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	69,913	55,080	50,874
R^2	0.1479	0.0779	0.2492

NOTE. —This table reports estimates of equation (2) using the 2011, 2013, 2015, 2017 and 2019 waves of the China Household Finance Survey (CHFS). The sample is restricted to urban local registered residents aged 16-65. The dependent variables are a dummy for having a job (column 1), daily working hours (2), and the log of monthly labour wage after tax (3). "Treat (3-5 million) *Post", "Treat (1-3 million) *Post", "Treat (0.5-1 million) *Post", and "Treat (<0.5 million) *Post" are interaction terms between city-size treatment groups and the post-reform period; the omitted category is cities with population above 5 million. All regressions include individual-level controls (gender, age, marital status, year of schooling, number of children and number of elderly household members), baseline city-level controls (log GDP and log of the tertiary sector's share in GDP), interactions between baseline city-level controls and a linear time trend, city fixed effects and year fixed effects. Standard errors clustered at the city level are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

4.3 Gender-Specific Effects

Table 3 builds on the baseline full-sample results by splitting the sample of urban local registered residents into male and female subsamples and estimating equation (2) separately for each. This allows us to characterise the heterogeneous patterns of the hukou reform across gender groups. Overall, the positive effects of the reform on women's employment, working hours, and wages are markedly stronger, suggesting that the full-sample results are to a large extent likely driven by the female subsample.

In the male subsample, column (1) shows that, except for the 3-5 million group, the employment coefficients for the other three treatment groups are positive. The coefficients on $TreatGroup_{cj} \times Post_t$ for the 1-3 million,

0.5-1 million, and below-0.5-million groups are 0.0075, 0.0125, and 0.0106, respectively, statistically significant at the 10% or 5% level and corresponding to an increase in employment rates of roughly 0.8-1.3 percentage points. For daily working hours (column (2)) and the logarithm of post-tax monthly wages (column (3)), coefficients are only marginally significant for the 0.5-1 million and below-0.5-million groups. Taken together, the positive impact of the hukou reform on male urban local registered residents is mainly concentrated in medium-sized and small cities and is relatively modest across the three dimensions of employment, working hours, and wages.

In the female subsample, column (4) shows that the employment coefficients for all four treatment-city groups are positive and significant at the 1% level, with estimates of 0.0214, 0.0376, 0.0562, and 0.0553. This indicates that, after the reform, employment rates among female urban local registered residents increased substantially across all treatment-city groups. The effects on working hours are particularly pronounced for women. In column (5), the coefficients on $TreatGroup_{cj} \times Post_t$ are 0.4378, 0.4580, 0.8041, and 0.9144 for the four treatment groups, all significant at the 1% level, implying that female local residents experienced an increase of about 0.4-0.9 hours in daily working time after the reform. Compared with the male subsample, the employment and working-hours coefficients for women are uniformly larger across city groups, suggesting that, among women, the reform had a stronger impact on the intensity of labour supply. For wages, column (6) shows that the wage coefficients for the 0.5-1 million and below-0.5-million groups are 0.1529 and 0.1377, respectively, and are significant at the 5% level, whereas the coefficients for the 3-5 million and 1-3 million groups are positive but not statistically significant. As in the male subsample, significant wage improvements for women are mainly concentrated in medium-sized and small cities.

Comparing Table 3 with the full-sample results in the previous subsection, we see that the overall pattern of higher employment and longer working hours in treatment cities, and significantly higher wages in small and medium-sized cities, appears more clearly in the female subsample and is noticeably weaker among men. Combined with the earlier theoretical discussion on gender roles and intra-household division of labour, this finding can be interpreted as follows: under the same city-level hukou-policy shock, female urban local registered residents adjust their employment and working hours more strongly. This pattern is consistent with the direction highlighted in the international literature on the relationship between low-skilled migration, service-sector expansion, and women's labour supply. For example, Cortés and Tessada (2011) and related studies show that in countries such as the United States, low-skilled migrants concentrate in domestic and care services, thereby expanding the supply of market-based household services and relaxing time constraints for some women. Although China's institutional framework and industrial structure are not identical to those contexts, the estimates for the female subsample in Table 3 motivate our subsequent supply-side (e.g. changes in domestic-service expenditure and job stability) and demand-side (sectoral expansion and job opportunities) analyses of similar mechanisms[7].

[7] Because we adopt a grouped DID specification along the gender dimension rather than a triple-differences design, the above discussion of male-female differences is based mainly on comparisons of coefficient magnitudes and significance patterns and is descriptive in nature. It does not constitute a strict causal estimate of the additional policy impact on women relative to men. In the subsequent analysis of intersecting heterogeneity by gender and education, we maintain this cautious stance in causal interpretation.

Table 3: Impact of the Hukou Reform on the Labour Market Outcomes of Urban Local Registered Residents

(Gender Heterogeneity)

	Male			Female		
	(1)	(2)	(3)	(4)	(5)	(6)
	Job	Work hours	Log (Wage)	Job	Work hours	Log (Wage)
Treat (3-5 million) *Post	-0.0048	-0.0243	0.0560	0.0214***	0.4378***	0.0650
	(0.0039)	(0.1192)	(0.0539)	(0.0076)	(0.1544)	(0.0619)
Treat (1-3 million) *Post	0.0075*	0.1508	0.0501	0.0376***	0.4580***	0.0595
	(0.0043)	(0.1166)	(0.0579)	(0.0087)	(0.1380)	(0.0540)
Treat (0.5-1 million) *Post	0.0125**	0.3087*	0.1026*	0.0562***	0.8041***	0.1529**
	(0.0057)	(0.1636)	(0.0616)	(0.0127)	(0.2033)	(0.0593)
Treat (<0.5 million) *Post	0.0106**	0.3337*	0.1450**	0.0553***	0.9144***	0.1377**
	(0.0051)	(0.1769)	(0.0689)	(0.0136)	(0.2109)	(0.0632)
Individual-level controls	Yes	Yes	Yes	Yes	Yes	Yes
City-level controls(pre-policy)	Yes	Yes	Yes	Yes	Yes	Yes
City-level control*Time trend	Yes	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	39,441	30,822	29,109	30,452	24,239	21,739
R^2	0.0938	0.0388	0.2408	0.2102	0.1307	0.2505

NOTE. —This table reports estimates of equation (2) using the 2011, 2013, 2015, 2017 and 2019 waves of the China Household Finance Survey (CHFS). The sample is restricted to urban local registered residents aged 16-65. Columns (1)-(3) use the male sub-sample; columns (4)-(6) use the female sub-sample. The dependent variables are a dummy for having a job (columns 1 and 4), daily working hours (2 and 5), and the log of monthly labour wage after tax (3 and 6). "Treat (3-5 million) *Post", "Treat (1-3 million) *Post", "Treat (0.5-1 million) *Post", and "Treat (<0.5 million) *Post" are interaction terms between city-size treatment groups and the post-reform period; the omitted category is cities with population above 5 million. All regressions include individual-level controls (gender is dropped in sub-sample regressions), baseline city-level controls (log GDP and log of the tertiary sector's share in GDP), interactions between baseline city-level controls and a linear time trend, city fixed effects and year fixed effects. Standard errors clustered at the city level are reported in parentheses. *, **, and *** indicate statist

4.4 Education-Specific Effects

In the theoretical analysis above, the skill dimension is regarded as one of the key margins along which the distributional effects of migration shocks unfold. Ideally, if more direct measures of skills, such as job tasks, occupational skill levels, or detailed occupational categories, were observable, the sample could be split explicitly into high-skill and low-skill groups. In the CHFS data, however, unified information on skill levels is lacking, and the available occupational classifications are not sufficient to construct stable and comparable skill indicators for the full sample. Following a large body of international and Chinese research, this paper therefore uses educational attainment as a proxy for skill, defining college and above as high-education and less than college as low-education, and splitting the sample of urban local registered residents accordingly. Using education as a proxy for skill is common practice in studies of the impact of migration on local labour markets: for example, Borjas (2003) and Peri and Sparber (2009), when analysing the effects of immigration on natives' wages and task specialisation, group

native workers by education level to represent different skill tiers; several studies in the Chinese context likewise adopt similar education-based groupings to distinguish high- and low-skilled local labour (e.g. Ma, Li and Iwasaki, 2023). Against this background, the education-based grouping in this paper is comparable to that in the existing literature.

Table 4 splits the sample of urban local registered residents into a high-education group and a low-education group using the above criterion and estimates equation (2) separately for the two subsamples to depict the heterogeneous patterns of the hukou reform across education levels. For the high-education group, column (1) shows that all four treatment coefficients on employment are positive, but small in magnitude and not statistically significant at conventional levels. For working hours (column (2)), the coefficients on $TreatGroup_{cj} \times Post_t$ for the 0.5-1 million and below-0.5-million groups are 0.5668 and 0.5510, respectively, and significant at the 1% level, indicating that daily working hours among highly educated local residents increased by about 0.55 hours in medium-sized and small cities after the reform, while the coefficients for the 3-5 million and 1-3 million groups are positive but insignificant. Turning to wages, column (3) shows that only the 3-5 million group has a significant coefficient (0.1375, significant at the 5% level); the other three treatment groups do not pass significance tests. Overall, among highly educated urban local registered residents, changes in employment probabilities after the reform are modest, increases in working hours are concentrated in small and medium-sized cities, and significant wage gains are mainly observed in the 3-5 million group.

The results for the low-education group display a more systematic pattern of positive effects. Column (4) shows that the employment coefficients for all four treatment-city groups are positive; the coefficients for the 1-3 million, 0.5-1 million, and below-0.5-million groups are 0.0201, 0.0310, and 0.0266, respectively, all significant at the 1% level, while the coefficient for the 3-5 million group is 0.0055, positive but insignificant. Compared with the high-education group, the increases in employment rates are numerically more pronounced for low-educated locals in all treatment groups except the largest cities. Similarly, for working hours (column (5)), the coefficients for the 1-3 million, 0.5-1 million, and below-0.5-million groups are 0.2534, 0.4214, and 0.4864, all significant at the 1% level, whereas the coefficient for the 3-5 million group is 0.1438, positive but not statistically significant. This indicates that, among low-educated locals, working hours increase markedly in medium-sized and small cities after the reform. For wages (column (6)), the coefficients for the 0.5-1 million and below-0.5-million groups are 0.1075 and 0.1430, significant at the 10% and 5% levels, respectively, while the coefficients for the 3-5 million and 1-3 million groups are close to zero and not significant. In other words, significant wage improvements for low-educated locals are mainly concentrated in the two smaller city groups.

A descriptive comparison of the high- and low-education results yields the following situation. After the reform, employment rates among highly educated locals change only modestly, increases in working hours are concentrated in small and medium-sized cities, and significant wage gains are mainly found in the 3-5 million group. By contrast, low-educated locals exhibit higher employment rates and longer working hours in most treatment-city groups, and their wages improve to some extent in small and medium-sized cities. Combined with the CMDS evidence that the share of low-educated migrants among incoming migrants to small and medium-sized cities rose significantly after the hukou reform, this suggests that, within the low-education local population, the reform coincided with a series of favourable labour-market adjustments: higher employment probabilities, longer working hours, and, in some cities, higher wage levels. This pattern is consistent with the direction highlighted in the international literature that uses education as a proxy for skill and finds relatively strong distributional effects of migration shocks among

low-skilled natives (Borjas, 2003; Dustmann, Frattini and Preston, 2013).

Table 4: Impact of the Hukou Reform on the Labour Market Outcomes of Urban Local Registered Residents

(Education Heterogeneity)

	High Education			Low Education		
	(1)	(2)	(3)	(4)	(5)	(6)
	Job	Work hours	Log (Wage)	Job	Work hours	Log (Wage)
Treat (3-5 million) *Post	0.0015	0.1189	0.1375**	0.0055	0.1438	0.0064
	(0.0033)	(0.1471)	(0.0549)	(0.0046)	(0.1263)	(0.0611)
Treat (1-3 million) *Post	0.0058	0.1498	0.0727	0.0201***	0.2534***	0.0328
	(0.0044)	(0.1160)	(0.0591)	(0.0054)	(0.0921)	(0.0516)
Treat (0.5-1 million) *Post	0.0104	0.5668***	0.1115	0.0310***	0.4214***	0.1075*
	(0.0063)	(0.1951)	(0.0749)	(0.0079)	(0.1441)	(0.0546)
Treat (<0.5 million) *Post	0.0110	0.5510***	0.0736	0.0266***	0.4864***	0.1430**
	(0.0076)	(0.2010)	(0.0814)	(0.0079)	(0.1572)	(0.0624)
Individual-level controls	Yes	Yes	Yes	Yes	Yes	Yes
City-level controls(pre-policy)	Yes	Yes	Yes	Yes	Yes	Yes
City-level control*Time trend	Yes	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	19,475	17,025	15,683	50,422	38,041	35,173
R^2	0.0686	0.0476	0.2200	0.1728	0.0983	0.1715

NOTE. —This table reports estimates of equation (2) using the 2011, 2013, 2015, 2017 and 2019 waves of the China Household Finance Survey (CHFS). The sample is restricted to urban local registered residents aged 16-65. Columns (1)-(3) use the high-education sub-sample (college degree and above); columns (4)-(6) use the low-education sub-sample (below college). The dependent variables are: a dummy for having a job (columns 1 and 4), daily working hours (2 and 5), and the log of monthly labour wage after tax (3 and 6). "Treat (3-5 million) *Post", "Treat (1-3 million) *Post", "Treat (0.5-1 million) *Post", and "Treat (<0.5 million) *Post" are interaction terms between city-size treatment groups and the post-reform period; the omitted category is cities with population above 5 million. All regressions include individual-level controls (years of schooling is dropped in sub-sample regressions), baseline city-level controls (log GDP and log of the tertiary sector's share in GDP), interactions between baseline city-level controls and a linear time trend, city fixed effects and year fixed effects. Standard errors clustered at the city level are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

4.5 Intersection of Gender and Education: Heterogeneity among Female Groups

The gender-split results above show that, among urban local registered residents, the most pronounced post-reform improvements in employment and working hours are concentrated in the female subsample. Combined with the theoretical and empirical discussion, this is consistent with the idea that women face tighter constraints in household production and care responsibilities and are therefore more sensitive to changes in domestic-service supply and the expansion of service-sector jobs (Cortés and Tessada, 2011). Against this background, further distinguishing women by education (skill) level and comparing the heterogeneous responses of highly educated and

low-educated women becomes particularly important. Accordingly, in this subsection, we divide the female sample into a high-education group and a low-education group and estimate equation (2) separately for each; the results are reported in Table 5. The corresponding results for the male sample are summarised in Appendix Table A3 for comparison.

In the high-education female sample, column (1) shows that the employment coefficients for all four treatment-city groups are small and statistically insignificant, indicating that the employment rate of highly educated female locals did not change appreciably after the reform. In column (2), only the 0.5-1 million and below-0.5-million groups have significant coefficients on $TreatGroup_{cj} \times Post_t$, at 0.5972 and 0.5253, respectively, both significant at the 10% level, implying that in these two categories of small and medium-sized cities, highly educated women's daily working hours increased by about 0.5-0.6 hours on average. Column (3) shows that, in the 3-5 million group, the wage coefficient for highly educated women is 0.1496 and significant at the 5% level, while the wage coefficients for the other city groups are positive but not statistically significant. Overall, for highly educated female local residents, the main post-reform adjustments are a marginal increase in working hours in small and medium-sized cities and some wage gains in larger cities, with no clear change in employment rates.

The results for low-educated women are more striking. Column (4) shows that the employment coefficients for all four treatment-city groups are positive. The $TreatGroup_{cj} \times Post_t$ coefficients for the 3-5 million, 1-3 million, 0.5-1 million, and below-0.5-million groups are 0.0187, 0.0341, 0.0562, and 0.0500, respectively, all significant at the 5% or 1% level, indicating that employment rates among low-educated women increased notably across all treatment-city groups after the reform. In column (5), the working-hours coefficients for the four treatment groups are 0.3666, 0.3844, 0.6607, and 0.8004, all significant at the 1% level, implying that daily working hours among low-educated women increased by about 0.37-0.80 hours after the reform, with larger estimated effects in smaller cities. Column (6) reports the wage results: in the 0.5-1 million and below-0.5-million groups, the wage coefficients for low-educated women are 0.1662 and 0.1613, respectively, both significant at the 5% level, whereas the wage coefficients for the 3-5 million and 1-3 million groups are positive but insignificant. Thus, among low-educated female local residents, employment rates and working hours rise significantly in all treatment-city groups, and post-tax monthly wages increase significantly in small and medium-sized cities.

A descriptive comparison of highly educated and low-educated women yields the following situation. On the one hand, both groups of women experience increase in working hours in small and medium-sized cities, but the coefficients for low-educated women are larger in magnitude, and their employment rates rise significantly in all treatment-city groups. On the other hand, in terms of wages, significant gains for highly educated women are concentrated in the large-city group with 3-5 million residents, whereas significant wage improvements for low-educated women appear in the 0.5-1 million and below-0.5-million groups. Taken together with the CMDS evidence that, after the hukou reform, the shares of low-educated migrants and low-skilled service workers among incoming migrants to small and medium-sized cities increased markedly, these results suggest that, within the population of low-educated female locals, the reform coincided with simultaneous improvements in employment, working hours, and wages (in small and medium-sized cities). This, in turn, indicates relatively high participation of this group in the process of urban labour-market adjustment.

To present the full findings of the intersection between gender and education, we also conduct the same

education-split analysis for the male sample; the results are reported in Appendix Table A3. In brief, highly educated men show some increases in employment and working hours in small and medium-sized cities, and their wage effects are similar to those for highly educated women, with significant gains only in the 3-5 million group. By contrast, the coefficients on employment, working hours, and wages for low-educated men in treatment cities are almost all statistically insignificant. Compared with the results for women, educational heterogeneity within the male sample is relatively weak. Given that the focus of this paper is on women's labour supply and its relationship with low-skilled migrant inflows, and that the empirical adjustments are more pronounced for the female subsample, the subsequent mechanism analysis mainly centres on women, with the results for men discussed only briefly as supplementary evidence.

Table 5: Impact of the Hukou Reform on the Labour Market Outcomes of Urban Local Registered Residents Women (Education Heterogeneity)

	High Education Female			Low Education Female		
	(1)	(2)	(3)	(4)	(5)	(6)
	Job	Work hours	Log (Wage)	Job	Work hours	Log (Wage)
Treat (3-5 million) *Post	0.0049	0.3003	0.1496**	0.0187**	0.3666**	0.0212
	(0.0052)	(0.2047)	(0.0680)	(0.0084)	(0.1578)	(0.0728)
Treat (1-3 million) *Post	0.0078	0.2097	0.0580	0.0341***	0.3844***	0.0623
	(0.0057)	(0.1813)	(0.0734)	(0.0095)	(0.1403)	(0.0602)
Treat (0.5-1 million) *Post	0.0025	0.5972*	0.1203	0.0562***	0.6607***	0.1662**
	(0.0096)	(0.3383)	(0.1004)	(0.0142)	(0.2042)	(0.0645)
Treat (<0.5 million) *Post	0.0149	0.5253*	0.0854	0.0500***	0.8004***	0.1613**
	(0.0112)	(0.2735)	(0.1021)	(0.0143)	(0.2200)	(0.0709)
Individual-level controls	Yes	Yes	Yes	Yes	Yes	Yes
City-level controls(pre-policy)	Yes	Yes	Yes	Yes	Yes	Yes
City-level control*Time trend	Yes	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	8,862	7,905	7,223	21,574	16,316	14,505
R^2	0.0972	0.0605	0.2038	0.2463	0.1708	0.1801

NOTE. —This table reports estimates of equation (2) using the 2011, 2013, 2015, 2017 and 2019 waves of the China Household Finance Survey (CHFS). The sample is restricted to urban local registered women aged 16-65. Columns (1)-(3) use the high-education female sub-sample (college degree and above); columns (4)-(6) use the low-education female sub-sample (below college). The dependent variables are a dummy for having a job (columns 1 and 4), daily working hours (2 and 5), and the log of monthly labour wage after tax (3 and 6). "Treat (3-5 million) *Post", "Treat (1-3 million) *Post", "Treat (0.5-1 million) *Post", and "Treat (<0.5 million) *Post" are interaction terms between city-size treatment groups and the post-reform period; the omitted category is cities with population above 5 million. All regressions include individual-level controls (age, marital status, number of children, number of elderly household members), baseline city-level controls (log GDP and log of the tertiary sector's share in GDP), interactions between baseline city-level controls and a linear time trend, city fixed effects and year fixed effects. Standard errors clustered at the city level are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

4.6 Robustness Checks

This subsection conducts several robustness checks on the baseline results and heterogeneity analyses to further assess the credibility of the identification strategy. Given that this paper adopts a multi-group city-size-by-time difference-in-differences framework, the key identifying assumption remains that, in the absence of the policy shock, labour-market outcomes of urban local registered residents in different city-size groups would have evolved along similar trends. We address this concern from three angles: event-study analysis, permutation-based individual-level placebo tests, and robustness to alternative sample definitions.

First, Figure 2 presents the event–study estimates based on specification (1), which are used to examine whether the hukou reform generated a clear institutional shock to the structure of the migrant population. Panel A uses an indicator for being a low-educated migrant as the dependent variable, and Panel B uses an indicator for employment in low-skilled service sectors as the dependent variable; both panels plot results separately for the four city-size treatment groups. All coefficients represent the treatment effects for each survey year relative to 2013 (the baseline year), and the vertical lines denote 95% confidence intervals. As shown in the figure, before the implementation of the reform, the point estimates for 2011 in all treatment groups are generally close to zero, their confidence intervals cross the zero axis, and there is no monotonic upward or downward pattern across city-size groups. This suggests that, before the policy was introduced, the evolution of migrants' educational and sectoral structures in treatment cities and control cities followed broadly similar paths. After the reform, however, the coefficients for 2015 and 2017 turned clearly positive in most treatment groups. In the 1–3 million, 0.5–1 million, and below-0.5-million city groups, both the share of low-educated migrants and the share of migrants employed in low-skilled service sectors display a persistently rising pattern, with confidence intervals that mostly no longer include zero. This dynamic pattern is consistent with the baseline DID results in Table 1 and indicates that the 2014 hukou reform did lead small and medium-sized cities to absorb more low-educated migrants working in low-skilled service jobs, and that this structural change did not exhibit any pronounced pre-trend before the policy.

Similar event–study evidence is also documented in An et al. (2024). Using the same policy background of the 2014 hukou reform and the same city-size grouping, and drawing on CMDS data for 2011–2017 to study migrant wages and other outcomes, that paper likewise finds that dynamic coefficients for key labor-market indicators across city-size groups fluctuate around zero without systematic pre-trends before the reform, whereas the coefficients for treatment cities begin to diverge significantly from those of control cities only after the policy is implemented. This external evidence, which is highly comparable to Figure 2 in terms of policy setting and event–study design, further supports our treatment of the parallel-trend assumption from the perspective of the migrant population.

Similarly, Figure 3 reports the event–study estimates based on specification (2), which are used to assess the dynamic impact of the reform on the labour-market outcomes of urban local registered residents. Panel A, Panel B, and Panel C correspond to three dependent variables: having a job, daily working hours, and the logarithm of monthly wages, respectively, and again plot results for the four city-size treatment groups. All panels use 2013 as the baseline year, and the plotted point estimates represent treatment effects for each year relative to 2013. As shown in the figure, before the policy was implemented, the estimated coefficients for 2011 are generally small and statistically insignificant across all treatment groups, and there is no systematic divergence in trends across city-size groups. This provides supporting evidence for the parallel-trend assumption at the level of urban local registered residents. After the reform, the coefficients for 2015 and 2017 turn positive in most cases. The positive impacts on employment probability and daily working hours are particularly pronounced in the 1–3 million, 0.5–1 million, and

below-0.5-million city groups, while the positive wage effects are mainly concentrated in medium-sized and smaller cities, with the 3–5 million group showing a more moderate wage response. This dynamic pattern is consistent with the baseline DID estimates in Tables 2–5: in the absence of systematic pre-trends, the implementation of the hukou reform is associated with a marked improvement in employment and labour-supply intensity among urban local registered residents in treatment cities, alongside some increase in wage levels in selected city groups.

It is worth noting that An et al. (2024), using CFPS data for 2012–2018 to examine wages and labour-force participation among urban local hukou holders, adopt the same city-size grouping and a similar event–study framework as in this paper. Their results likewise show that, before the reform, the dynamic coefficients for labour-market outcomes of local residents across different city-size groups are close to zero and do not exhibit systematic pre-trends, whereas after the reform, the coefficients for treatment groups begin to diverge significantly. Taken together with our CHFS-based event-study results, this suggests that, in the context of the 2014 hukou reform, a DID/event-study design based on city-size groupings enjoys a certain degree of empirical support with respect to the parallel-trend assumption.

Second, we implement permutation-based individual-level placebo tests to examine whether the baseline DID coefficients could be driven by random fluctuations. Specifically, we keep the sample structure fixed but repeatedly randomise the treatment assignment at the city level (preserving the sample size of each city-size group), re-estimating the baseline city-average DID coefficient after each reshuffle. Repeating this procedure several hundred times yields an empirical distribution of DID estimates under fictitious policies. Figure 4 reports the placebo distributions and corresponding empirical p-values for employment, working hours, and wages. For all three outcomes, the distributions of DID coefficients under placebo treatment are approximately centred around zero and exhibit a symmetric bell-shaped pattern, whereas the DID coefficients estimated under the true policy lie in the right tail of the distribution, with only a small fraction of placebo experiments generating larger coefficients than the actual estimate. This result indicates that, even when allowing for random reallocation of the treatment status at the individual level, the DID estimates obtained from our sample size and variation are difficult to reproduce purely through random noise, thereby providing randomisation-based support for the baseline results. Such permutation-based robustness checks have also been employed in recent studies using the 2014 hukou reform to strengthen confidence in standard DID inference (Liu et al., 2024; Zhang et al., 2024).

Third, we conduct additional robustness analysis regarding the composition of the urban local registered resident sample. As discussed in the data section, because earlier CHFS waves do not contain a unified measure of hukou migration history, our definition of locals may unavoidably include some individuals who migrated earlier and subsequently obtained local hukou. To assess the impact of this potential contamination, we make use of the additional questions introduced in the 2019 survey on whether respondents have ever changed their hukou and when the change occurred. Among respondents who could answer these questions, about 62% provided valid responses; within this subsample, around 13% reported having changed their hukou, while about 48% reported never having changed it.

We first compute descriptive statistics for respondents who changed their hukou. Appendix Table A4 summarises the characteristics of this group by migration period. Among all individuals who report a change in hukou, the average years of schooling are about 13.9, and the share with college education and above is around 40%. When restricting migration years to 2000-2014 or 2010-2014, the average years of schooling rise to 14.28 and 14.55,

respectively, and the share with college education and above increases to about 0.47 and 0.51. By contrast, for those who changed hukou after 2014, the average years of schooling are 14.15, and the share with college education and above is around 0.44. In other words, urban residents who migrated and obtained local hukou during the decade prior to the reform are, on average, more highly educated, whereas post-reform entrants have slightly lower years of schooling and a lower share of higher education. This pattern is consistent with the CMDS evidence that, after the reform, small and medium-sized cities attracted relatively more low-educated migrants.

Building on this, we construct a stricter native sample: among 2019 respondents with valid answers to the hukou-migration question, we retain only those urban hukou holders who report never having changed their hukou, and re-estimate equation (2) and the previous heterogeneity specifications on this subsample. Compared with the baseline results, the main treatment effects on employment, working hours, and wages, both in the full sample and in subsamples split by gender and education, remain almost identical in terms of sign and statistical significance (the corresponding regression results are reported in Appendix Tables A5-A9). Taken together with the descriptive evidence on migration periods, this check suggests that, on the one hand, there is indeed a group of highly educated early migrants who obtained local hukou before the reform, mainly concentrated in earlier years; on the other hand, even when strictly excluding all individuals who report any hukou migration, our main conclusions regarding the impact of hukou reform on urban local labour markets remain robust, alleviating concerns that contamination from early migrants is driving the results.

Overall, the evidence from these three robustness exercises points in the same direction. First, the event-study results reveal no systematic pre-trends before policy implementation, while post-reform coefficients move in the expected direction. Second, permutation-based individual-level placebo tests show that the baseline DID coefficients are unlikely to be explained by random noise. Third, the robustness of the results under a stricter definition of urban local registered residents suggests that our main conclusions are not sensitive to sample composition. Taken together, these findings indicate that the baseline conclusions of this paper regarding the impact of hukou reform on urban local labour markets are robust along multiple dimensions. Building on this identification foundation, the next section turns to potential supply-side and demand-side mechanisms.

5 Mechanism Analysis: Understanding Gender- and Education-Specific Patterns

5.1 Conceptual Framework: Supply-Side and Demand-Side Channels

The empirical results above show that, following the 2014 hukou reform, small and medium-sized cities (excluding megacities) absorbed more low-educated migrants who were concentrated in low-skilled service jobs. Against this backdrop, employment and working hours among urban local registered residents increased broadly, wage improvements were mainly concentrated in small and medium-sized cities, and the responses were particularly pronounced for low-educated women. Section 2 has already discussed, with reference to the related literature, how low-skilled migrants may affect local labour markets through channels such as domestic-service provision, task reallocation, and firm expansion. In this section, we translate these potential mechanisms into testable empirical hypotheses and organise the subsequent mechanism regressions accordingly.

On the supply side, the inflow of low-skilled migrants induced by hukou reform may, on the one hand, alter the occupational distribution of local residents by moving some local workers from unstable informal jobs into

relatively more stable formal positions. On the other hand, as low-skilled migrants enter domestic and care services, they may expand the supply of household services, allowing local women, who bear a disproportionate share of household responsibilities, to outsource part of their housework and thus increase their labour supply. To examine these two channels, we will use CHFS information on occupations to construct an indicator of stable jobs and test whether local residents are more likely to hold stable employment after the reform. At the same time, we will use household expenditure data to construct measures of domestic-service spending and test whether household spending on domestic services, especially in households with low-educated women, increased after the reform. If the supply-side mechanisms are operative, we expect to observe relatively larger post-reform increases in the incidence of stable jobs and domestic-service spending in treatment cities than in control cities, particularly within the low-educated female subsample.

On the demand side, relaxing settlement restrictions may expand city population size, enlarge local markets, and increase labour supply, thereby indirectly stimulating urban economic activity and firms' demand for labour. Using data from the China City Statistical Yearbook, we will examine post-reform changes across city groups in GDP, registered urban hukou population, population density, the number of participants in the basic urban employee pension scheme, industrial electricity consumption, and sectoral employment, with particular attention to labour-intensive industries and industries with a high share of female employment. If demand-side expansion is an important channel, we should observe stronger post-reform growth in output and employment in labour-intensive and female-intensive industries in small and medium-sized cities, consistent with the earlier finding that low-educated local women experienced rising employment and working hours.

The remainder of this section proceeds as follows. Section 5.2 focuses on supply-side adjustments among local residents (occupational stability and domestic-service consumption), while Section 5.3 turns to demand-side expansion at the city level (macroeconomic outcomes and sectoral employment structure), thereby jointly assessing the relative importance of these two channels in explaining the observed gender- and education-specific patterns.

5.2 Supply-Side Mechanisms: Occupational Stability and Household Service Use

This subsection uses CHFS data to examine whether supply-side adjustments by local residents, along the dimensions of occupational stability and domestic-service consumption, are consistent with the gender and education heterogeneity documented above. To maintain comparability with previous analyses, all regressions continue to use the multi-intensity DID specification in equation (2), estimated for the full sample and various subsamples. The coefficients capture, conditional on individual characteristics, baseline city characteristics and their time trends, city fixed effects, and year fixed effects, the average post-reform changes in treatment cities relative to control cities.

5.2.1 Changes in Occupational Stability

We begin by constructing an indicator of relatively stable occupations using the broad occupational categories reported in the CHFS. In the survey, respondents' current occupations are grouped into six categories: (1) heads of Party and government agencies and managers of public institutions and enterprises; (2) professionals and technical staff; (3) clerical and related personnel; (4) commercial and service workers; (5) agricultural, forestry, animal husbandry, fishery and water conservancy workers; and (6) production and transport equipment operators and related workers.

Consistent with the institutional features of China's urban labour market and prior research on occupational stratification and job quality, the first three categories are typically regarded as white-collar, which are more likely to be associated with formal employment relationships, relatively stable earnings and more comprehensive social-insurance coverage. By contrast, commercial and service workers, agricultural workers, and production and transport workers are predominantly concentrated in blue-collar and service-sector jobs, where informal and short-term employment is far more common (Wu and Treiman, 2004, 2007). This classification is in line with the standard practice in the Chinese social-stratification literature, which treats managers in Party–state and public institutions, professionals and clerical staff as high-skill white-collar occupational strata and classifies commercial/service workers and production operators as working-class. And it is also consistent with the ISCO-08 principle that assigns managers, professionals and clerical support workers to high-skill white-collar groups while placing service workers, agricultural workers, and production and transport workers in typical blue-collar and manual occupations (International Labour Organization, 2012).

Building on this rationale, we define a dummy variable, Stable job, which takes the value 1 if the respondent's occupation falls into categories (1)– (3) and 0 otherwise. This variable serves as a coarse proxy for employment stability, indicating whether a local registered resident holds a relatively stable and more formal job.

Table 6 reports estimation results for the full sample, the male subsample, and the female subsample. In the full sample, none of the four coefficients on $TreatGroup_{cj} \times Post_t$ is statistically significant, indicating that, for urban local registered residents as a whole, the share in relatively stable occupations does not exhibit systematic changes over time between treatment and control cities. Once we split the sample by gender, however, different internal patterns emerge. In the male subsample, the coefficients for the 3-5 million and 1-3 million groups are −0.0386 and −0.0437, respectively, both significant at the 10% level, indicating a modest decline in men's share in stable occupations in these two city groups after the reform; the coefficients for the 0.5-1 million and below-0.5-million groups are positive but insignificant. By contrast, in the female subsample, the coefficients for the 1-3 million and 0.5-1 million groups are 0.0551 and 0.0630, respectively, both significant at the 5% level, implying that the share of women in stable occupations increased by about 5-6 percentage points in these medium-sized cities; the coefficient for the below-0.5-million group is 0.0506, positive but not statistically significant.

These results suggest that, in small and medium-sized cities after the reform, female urban local registered residents are more likely to hold relatively stable occupations, whereas men in some city groups tend to shift slightly in the opposite direction, leading to an insignificant average effect in the full sample. Taken together with the earlier findings that low-educated women experienced significant increases in employment and working hours, Table 6 can be interpreted as complementary evidence of supply-side occupational restructuring: against the backdrop of large inflows of low-skilled migrants into low-skilled service occupations, local women appear to have some probability of moving from less stable jobs into more stable positions and units. The possibility that immigration may facilitate occupational upgrading for local workers has been discussed in the international literature. For example, Peri and Sparber (2009) find that when migrants enter routine and manual tasks, native workers are more likely to shift towards communication-intensive, non-routine tasks. Cortés and Tessada (2011) also argue that, when low-skilled migrants enter service sectors, local women are more likely to remain in higher-quality occupations.

5.2.2 Domestic-Service Consumption and Household Outsourcing

We next examine, at the household level, whether the consumption of domestic services expanded after the reform, and whether such expansion is more pronounced among low-education households. To this end, we first aggregate CHFS individual data to the household level. Specifically, we merge individuals by household ID and retain information on the respondent and (if present) the spouse. For married households, we use the education levels of the respondent and spouse to construct a household education variable; for households without a spouse, we classify households based solely on the respondent's education. On this basis, households are divided into two categories: High-education households: households in which both the respondent and the spouse have college education or above; if there is no spouse, households in which the respondent alone has college education or above are also classified as high-education households; and Low-education households: households in which both the respondent and the spouse have less than college education; if there is no spouse, households in which the respondent alone has less than college education are classified as low-education households.

In the processed sample, high-education households account for about 20% of all urban local registered resident households, and low-education households for about 80%. Defining high- and low-education households based on the educational combination of spouses is common in family and intergenerational research and can, to some extent, reflect the household's overall human-capital endowment and potential earning capacity. For example, Lindberg et al. (2022) construct a household socioeconomic position index using education and income to explain health inequalities. Erola, Jalonen and Lehti (2016), using Finnish register data, show that parental education is one of the most important family-background variables for children's occupational and income status. Althoff, Gray and Reichardt (2025) find that maternal human-capital indicators are, relative to paternal indicators, more predictive of children's long-run economic outcomes. Accordingly, in the context of household consumption and time-allocation analysis, defining high- and low-education households by spouses' education can be viewed as a reasonable proxy for household human capital and income capacity.

For domestic-service variables, we use CHFS consumption questions on household purchases of domestic services to construct two measures: first, an indicator for whether the household incurred any domestic-service expenditure during the survey year (Has service), defined as a 0-1 dummy; and second, the household's average monthly domestic-service expenditure (in RMB). Because the domestic-service spending variable contains many zeros and extreme values, taking logs directly would lead to sample loss and biased estimates. We therefore apply the inverse hyperbolic sine transformation, asinh(x), to domestic-service expenditure and use the transformed variable in regressions. The asinh transformation has a shape and elasticity interpretation similar to the logarithmic transformation for positive values, while allowing for zero and even negative values, and has become widely used in recent years to handle skewed variables such as income and wealth (Bellemare and Wichman, 2020; Aïhounton and Henningsen, 2021; Norton, 2022; Friedline, Masa and Chowa, 2015). Compared with a simple log (y + c) transformation, asinh behaves more smoothly near zero, preserves a log-like interpretation, and avoids arbitrary shifts imposed on zero values.

Table 7 first reports estimates for the full sample of urban local registered resident households. Column (1) shows that, in the 0.5-1 million and below-0.5-million groups, the coefficients on $TreatGroup_{cj} \times Post_t$ are 0.0400 and 0.0358, respectively, both significant at the 10% level, indicating that, after the reform, the share of

local households using domestic services in these small and medium-sized cities increased by about 3-4 percentage points; the coefficients for the 3-5 million and 1-3 million groups are positive but insignificant. In column (2), all coefficients on the asinh-transformed domestic-service expenditure variable are positive across city groups, but due to sample size and the discrete distribution of spending, they are not statistically significant. Thus, from the full-sample perspective, hukou reform is associated with an expansion in the extensive margin of domestic-service use in small and medium-sized cities, whereas evidence on whether intensive margins (average spending) increased significantly is less clear.

To align more closely with the education heterogeneity documented earlier, Table 8 further splits the sample by the respondent's education into high-education households (respondents with college education or above) and low-education households (respondents with less than college education) and estimates the same specifications for each group. The results show no systematic changes in domestic-service use or spending among high-education households; the coefficients for all city groups are statistically insignificant. The pattern for low-education households is markedly different. Column (3) indicates that, among low-education households, all four coefficients on Has service are positive; those for the 3-5 million and 1-3 million groups are significant at the 10% level, and those for the 0.5-1 million and below-0.5-million groups are significant at the 5% level, implying that the share of low-education households using domestic services increased by about 3-6 percentage points in these cities. In column (4), the asinh coefficients for domestic-service expenditure among low-education households are approximately 0.33, 0.36, and 0.41 in the 1-3 million, 0.5-1 million, and below-0.5-million groups, respectively, significant at the 10% or 5% level, whereas the coefficient for the 3-5 million group is positive but insignificant.

Taken together, these results indicate that the expansion of domestic-service consumption is concentrated among low-education households and is mainly observed in small and medium-sized cities where settlement restrictions were relaxed more and low-skilled migrant inflows were larger; by contrast, high-education households show no significant changes in either the probability of using domestic services or average spending. This pattern is highly consistent with the gender- and education-specific results above: precisely those low-education groups who are more disadvantaged in the labour market and bear heavier household responsibilities are the ones who, after the reform, both increase their labour supply and outsource part of their housework by purchasing domestic services. International evidence likewise suggests a close relationship between the expansion of domestic-service markets and changes in women's labour supply, particularly in societies with pronounced household divisions of labour and care constraints (Cortés and Tessada, 2011; Cortés and Pan, 2013).

It is important to note that, because CHFS does not systematically record time spent on housework and care by household members, we cannot directly observe changes in housework time or distinguish whether rising domestic-service expenditure is driven by freeing women's time or by other consumption preferences. The evidence presented here should therefore be interpreted as indirect support for a household-outsourcing mechanism, rather than a structural estimate of intra-household time allocation. Moreover, the domestic-service expenditure variable contains zeros and missing values; despite our use of the asinh transformation and rich individual and city controls, the estimates may still be affected by measurement error, which calls for caution in interpreting these findings.

Overall, the results in Tables 6-8 are directionally consistent with the main findings of the paper: the inflow of low-skilled migrants induced by hukou reform is accompanied by local women shifting towards relatively more stable occupations and by an expansion in domestic-service consumption among low-education households.

Together, these patterns provide a set of supply-side mechanisms that help explain the substantial increase in labour supply observed for these groups.

Table 6: Impact of the Hukou Reform on Employment in More Stable Occupations at Individual level

	Whether Employed in More Stable Occupations		
	All	Male	Female
	(1)	(2)	(3)
Treat (3-5 million) *Post	-0.0166	-0.0386*	0.0157
	(0.0219)	(0.0222)	(0.0279)
Treat (1-3 million) *Post	-0.0024	-0.0437*	0.0551**
	(0.0226)	(0.0239)	(0.0245)
Treat (0.5-1 million) *Post	0.0350	0.0147	0.0630**
	(0.0253)	(0.0265)	(0.0294)
Treat (<0.5 million) *Post	0.0165	-0.0108	0.0506
	(0.0271)	(0.0295)	(0.0312)
Individual-level controls	Yes	Yes	Yes
City-level controls(pre-policy)	Yes	Yes	Yes
City-level control*Time trend	Yes	Yes	Yes
City FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	44,840	25,734	19,085
R^2	0.1109	0.0995	0.1396

NOTE. —This table reports estimates of equation (2) using the 2011, 2013, 2015, 2017 and 2019 waves of the China Household Finance Survey (CHFS). The sample is restricted to urban local registered residents aged 16-65. The dependent variable is a dummy equal to one if the respondent is employed in a more stable occupation, defined as working in occupation categories 1-3 (government/enterprise managers, professionals, and clerical staff) and zero otherwise (occupation categories 4-6: commercial and service workers, agricultural workers, and production/transport operators). Column (1) uses the full sample, column (2) restricts to men, and column (3) restricts to women. "Treat (3-5 million) *Post", "Treat (1-3 million) *Post", "Treat (0.5-1 million) *Post", and "Treat (<0.5 million) *Post" are interaction terms between city-size treatment groups and the post-reform period; the omitted category is cities with population above 5 million. All regressions include individual-level controls, baseline city-level controls (log GDP and log of the tertiary sector's share in GDP), interactions between baseline city-level controls and a linear time trend, city fixed effects and year fixed effects. Standard errors clustered at the city level are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 7: Impact of the Hukou Reform on the Domestic Services at Household level

	(1)	(2)
	Has service	Log (Service Spending)
Treat (3-5 million) *Post	0.0109	0.0587
	(0.0189)	(0.1233)
Treat (1-3 million) *Post	0.0303	0.1941
	(0.0196)	(0.1271)
Treat (0.5-1 million) *Post	0.0400*	0.2141
	(0.0209)	(0.1356)
Treat (<0.5 million) *Post	0.0358*	0.2228
	(0.0215)	(0.1385)
Individual-level controls	Yes	Yes
City-level controls(pre-policy)	Yes	Yes
City-level control*Time trend	Yes	Yes
City FE	Yes	Yes
Year FE	Yes	Yes
N	43,075	43,075
R^2	0.0278	0.0331

NOTE. —This table reports estimates of equation (2) at the household level using the 2011, 2013, 2015, 2017 and 2019 waves of the China Household Finance Survey (CHFS). The sample is restricted to urban local registered households. The dependent variable in column (1) is a dummy equal to one if the household reports any spending on domestic services (Has service). The dependent variable in column (2) is the inverse hyperbolic sine transformation of monthly household expenditure on domestic services (asinh(Log Service spending)), which allows zeros and is approximately comparable to a log transformation for positive values. "Treat (3-5 million) *Post", "Treat (1-3 million) *Post", "Treat (0.5-1 million) *Post", and "Treat (<0.5 million) *Post" are interaction terms between city-size treatment groups and the post-reform period; the omitted category is cities with population above 5 million. All regressions include individual-level controls, baseline city-level controls (log GDP and log of the tertiary sector's share in GDP), interactions between baseline city-level controls and a linear time trend, city fixed effects and year fixed effects. Standard errors clustered at the city level are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 8: Impact of the Hukou Reform on the Domestic Services at Household level by Education

	Household with High Education		Household with Low Education	
	(1)	(2)	(3)	(4)
	Has service	Service Spending	Has service	Service Spending
Treat (3-5 million) *Post	-0.0292	-0.2026	0.0361*	0.2538
	(0.0316)	(0.1918)	(0.0218)	(0.1612)
Treat (1-3 million) *Post	0.0344	0.1761	0.0463*	0.3264*
	(0.0315)	(0.1938)	(0.0237)	(0.1691)
Treat (0.5-1 million) *Post	0.0013	-0.0834	0.0557**	0.3604**
	(0.0411)	(0.2569)	(0.0246)	(0.1786)
Treat (<0.5 million) *Post	0.0090	0.0334	0.0591**	0.4070**
	(0.0457)	(0.2857)	(0.0252)	(0.1792)
Individual-level controls	Yes	Yes	Yes	Yes
City-level controls(pre-policy)	Yes	Yes	Yes	Yes
City-level control*Time trend	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	6,092	6,092	20,584	20,584
R^2	0.0426	0.0491	0.0263	0.0283

NOTE. —This table reports estimates of equation (2) at the household level using the 2011, 2013, 2015, 2017 and 2019 waves of the China Household Finance Survey (CHFS). The sample is restricted to urban local registered households and is split by household education. High-education households are defined as households in which both the respondent and the spouse (if present) have a college degree or above; single-person households are classified as high-education if the respondent has a college degree or above. Low-education households are defined as households in which both the respondent and the spouse (if present) have less than a college degree; single-person households are classified as low-education if the respondent has less than a college degree. Columns (1)-(2) use the sub-sample of high-education households; columns (3)-(4) use the sub-sample of low-education households. The dependent variable in columns (1) and (3) is a dummy equal to one if the household reports any spending on domestic services (Has service). The dependent variable in columns (2) and (4) is the inverse hyperbolic sine transformation of monthly household expenditure on domestic services (asinh(Log Service spending)). "Treat (3-5 million) *Post", "Treat (1-3 million) *Post", "Treat (0.5-1 million) *Post", and "Treat (<0.5 million) *Post" are interaction terms between city-size treatment groups and the post-reform period; the omitted category is cities with population above 5 million. All regressions include individual-level controls, baseline city-level controls (log GDP and log of the tertiary sector's share in GDP), interactions between baseline city-level controls and a linear time trend, city fixed effects and year fixed effects. Standard errors clustered at the city level are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

5.3 Demand-Side Mechanisms: Urban Economic Expansion and Sectoral Employment Structure

This subsection uses city-level data from the China City Statistical Yearbook (2000-2019) to examine whether the 2014 hukou reform affected the labour-market outcomes of urban local registered residents through labour-demand channels, focusing on three dimensions: macroeconomic expansion, the skill intensity of sectoral employment, and the gender composition of sectoral employment. The regression specification is consistent with the previous analysis: we work at the city-year level, adopt a multi-intensity DID design, and use the interaction terms between city-size treatment indicators $TreatGroup_{cj}$ and the post-reform dummy $Post_t$ as key explanatory

variables. We control for pre-reform city-level macro indicators and their time trends, as well as city and year fixed effects, and cluster standard errors at the city level.

5.3.1 City-Level Macroeconomic Indicators: Expansion of Output and Employment Capacity in Small and Medium-Sized Cities

Table 9 reports the impact of hukou reform on several city-level macro indicators. The dependent variables are, in turn: gross domestic product (GDP), the size of the registered hukou population, population density, the number of participants in the basic urban employee pension scheme, and industrial electricity consumption. The first two capture changes in overall economic and population scale, while the latter two can be viewed as approximate indicators of formal employment and the intensity of industrial activity.

The estimates show that, for cities with populations of 0.5-1 million and below 0.5 million, the coefficients on $TreatGroup_{cj} \times Post_t$ for GDP are positive and significant at the 5% level, whereas the coefficients for the 1-3 million and 3-5 million groups are positive but not statistically significant. This indicates that, relative to megacities where hukou policies remained essentially unchanged, small and medium-sized cities that experienced larger relaxations of hukou restrictions underwent relatively faster economic expansion after the reform. This finding is consistent with Guo and Xu (2025), who, using city-level data, show that the 2014 hukou reform significantly promoted economic growth in cities with populations between 1 and 5 million.

In terms of population and employment capacity, the coefficients for permanent population size and population density are generally positive for the 1-3 million, 0.5-1 million, and below-0.5-million city groups, with some coefficients reaching statistical significance in small and medium-sized cities. The coefficients on the number of pension contributors and industrial electricity consumption are also clearly positive in small and medium-sized cities, with several estimates significant at the 5% or 1% level. This suggests that, in these cities, not only did economic scale expand after the reform, but formal employment and industrial production also grew concurrently. Combined with evidence from Liu, Xu and Zou (2024), who find that hukou reform significantly increased entrepreneurial activity and the number of firms in reform regions, one may infer that the 2014 relaxation of hukou restrictions encouraged population and firms to concentrate in small and medium-sized cities, thereby enlarging local markets and expanding labour demand.

Overall, the results in Table 9 provide macro-level support for a demand-side expansion story: small and medium-sized cities exhibit stronger post-reform growth in output, population agglomeration, and formal employment, which is consistent with the earlier micro evidence that employment and working hours among urban local registered residents increased overall and more strongly in small and medium-sized cities.

5.3.2 Employment Structure in Skill-Intensive and Non-Skill-Intensive Sectors

To further analyse changes in the structure of labour demand, we follow Chen, Han and Han (2022) and Huang and Wang (2021) in classifying industries into skill-intensive and non-skill-intensive groups[8]. Using sectoral

[8] Skill-intensive industries include manufacturing; information transmission, software, and information technology services; scientific research and technical services; education; and health and social work.

Non-skill-intensive industries include: agriculture, forestry, animal husbandry, and fishery; mining; production and supply of

employment figures from the China City Statistical Yearbook, we construct the log of employment in skill-intensive and non-skill-intensive sectors for each city-year and estimate separate regressions; the results are reported in Table 10.

The regression results indicate that, in non-skill-intensive sectors, the coefficient on $TreatGroup_{cj} \times Post_t$ for the below-0.5-million group is positive and significant at the 5% level, and the coefficient for the 0.5-1 million group is also positive and close to statistical significance. By contrast, in skill-intensive sectors, coefficients for all city-size groups are small and not significant. This suggests that, after the hukou reform, new jobs in small and medium-sized cities were primarily created in non-skill-intensive sectors, such as construction and traditional services, which are labour-intensive, whereas employment expansion in skill-intensive sectors was relatively limited.

This pattern is broadly consistent with the evidence documented in Chen, Han and Han (2022) on digital economy development and skill-biased technological change: their findings suggest that, during urban industrial upgrading, both the skill composition of employment and the sectoral structure of labour demand adjust, while some degree of job creation can still be observed in medium- and low-skill positions. At the same time, it aligns with the phenomenon reported by Liu, Xu and Zou (2024), who find that newly created firms in reform-affected regions tend to be small in scale and exhibit relatively low survival rates, indicating that, in the short run, the reform is more closely associated with employment expansion driven by labor-intensive, small-scale enterprises than with an immediate, large-scale upgrading of high-skill industries.

From the perspective of this study, the expansion of employment in non-skill-intensive sectors implies rising demand for low-skilled labour, which is directionally consistent with the CHFS-based evidence that low-educated local residents—especially low-educated women—experienced significant increases in labour supply. In other words, by expanding labour demand in non-skill-intensive sectors in small and medium-sized cities, the hukou reform created more job opportunities for low-skilled local residents, thereby supporting the observed improvements in their employment and working hours from the demand side.

5.3.3 Sectoral Gender Composition and Employment Expansion in Female-Preferred Industries

Given that the most pronounced heterogeneity in the empirical results arises for women, particularly low-educated women, this subsection uses information on the gender composition of sectoral employment to examine whether the reform induced larger employment expansions in female-preferred industries. The sectoral classification follows Yang and Zhang (2019) and Wei (2015), who, using long-run data on sectoral employment, classify industries into female-concentrated, gender-balanced, and male-concentrated categories based on the female share of employment and analyse how sectoral gender segregation contributes to gender wage gaps.

Building on this literature, we classify industries into three groups according to the female employment share[9].

electricity, heat, gas, and water; construction; water conservancy, environment, and public facilities management; resident services, repair, and other services; accommodation and catering; wholesale and retail; real estate; finance; transportation, storage, and postal services; leasing and business services; public administration, social security, and social organisations; and culture, sports, and entertainment.

9 ・Female-preferred industries (female share > 50%): health, social security, and social services; accommodation and catering.

Using city-level employment data from the China City Statistical Yearbook, we aggregate employment by these three industry groups, construct the log of employment in each group, and estimate separate regressions; the results are presented in Table 11.

The estimates show that, in female-preferred industries, the coefficients on $TreatGroup_{cj} \times Post_t$ for the 0.5-1 million and below-0.5-million city groups are positive and significant at the 5% level, and the coefficient for the 1-3 million group is also positive and significant at the 10% level. In gender-balanced industries, the coefficients for the 0.5-1 million and below-0.5-million groups are likewise positive and significant. By contrast, in male-preferred industries, coefficients for all city-size groups are small and not statistically significant.

These findings indicate that post-reform employment expansion in small and medium-sized cities is concentrated in female-preferred and gender-balanced industries, while employment in male-preferred industries remains relatively stable. Given that female-preferred industries typically include many service jobs, as well as care and education positions, this pattern is consistent with our previous CMDS evidence showing an increased share of low-skilled service migrants, and with the CHFS evidence that low-educated women experienced significant increases in employment and working hours. From the demand side, hukou reform has thus promoted employment growth in service sectors, especially in female-concentrated industries, thereby creating more job opportunities for local women; from the supply side, local women have been able to take up these new jobs by shifting into more stable positions and outsourcing part of their housework.

The broader literature provides similar evidence. Liu, Xu and Zou (2024) find that hukou reform significantly raised entrepreneurial activity in reform regions, particularly through the creation of small service firms. Wang, Milner and Scheffel (2021) show that hukou reform increased firms' flexibility in adjusting employment, facilitating the reallocation of labour across firms and industries. Collectively, these studies point to a common conclusion: relaxing hukou constraints not only increases labour supply but also enhances firms' ability to create and adjust jobs by improving market size and the institutional environment for employment, thereby driving structural changes in labour demand at the city level.

Taken together, the city-level macro evidence indicates that the 2014 hukou reform significantly promoted economic expansion, population agglomeration, and formal employment growth in small and medium-sized cities, with new jobs concentrated in non-skill-intensive sectors and in female-preferred and gender-balanced industries. This demand-side result is directionally consistent with the CHFS-based micro results: overall employment and working hours among urban local registered residents increased, with the most pronounced responses observed for low-educated women. Although city-level regressions remain correlational within a quasi-natural-experiment setting and cannot exhaust all potential mechanisms, the consistency of supply-side and demand-side evidence across city size, industry type, and gender dimensions provides strong support for our interpretation that, in small and medium-sized cities, inflows of low-skilled migrants have helped create a relatively favourable labour-market

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・Gender-balanced industries (female share between 40% and 49.9%): finance; education; wholesale and retail; manufacturing; resident services; water conservancy and environmental facilities management; culture, sports, and entertainment.

・Male-preferred industries (female share < 40%): construction; mining; transportation, storage, and postal services; public administration and social organisations; production and supply of electricity, gas, and water; information and computer software services; scientific research and technical exploration; leasing and business services; real estate; agriculture, forestry, animal husbandry, and fishery.

environment for low-skilled local women.

Table 9: Impact of the Hukou Reform on the City-Level Economic Outcome

	(1)	(2)	(3)	(4)	(5)
	Log (Regional GDP)	Log (Registered population)	Log (Population density)	Log (Employee endowment insurance participants)	Log (Industrial electricity consumption)
Treat (3-5 million) *Post	0.1039	0.0321	0.3019	0.0556	0.4452***
	(0.0820)	(0.0728)	(0.3064)	(0.1442)	(0.1274)
Treat (1-3 million) *Post	0.1225	0.1092	0.3798	0.2652**	0.7481***
	(0.0784)	(0.0673)	(0.2534)	(0.1104)	(0.1404)
Treat (0.5-1 million) *Post	0.2101**	0.1773**	0.4777*	0.3473**	1.0391***
	(0.0970)	(0.0830)	(0.2544)	(0.1347)	(0.1786)
Treat (<0.5 million) *Post	0.2955**	0.2022**	0.5243**	0.4328***	1.5392***
	(0.1167)	(0.0960)	(0.2624)	(0.1584)	(0.2077)
City-level controls(pre-policy)	Yes	Yes	Yes	Yes	Yes
City-level control*Time trend	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
N	2,881	2,881	2,881	2,881	2,881
R^2	0.9776	0.9662	0.9242	0.9313	0.8812

NOTE. —This table reports estimates of equation (1) using a panel of prefecture-level cities from the China City Statistical Yearbook, 2000-2019. The dependent variables are, respectively, the log of regional GDP, the log of Registered population, the log of Population density, the log of the Employee endowment insurance participants, and the log of Industrial electricity consumption. "Treat (3-5 million) *Post", "Treat (1-3 million) *Post", "Treat (0.5-1 million) *Post", and "Treat (<0.5 million) *Post" are interaction terms between city-size treatment groups and the post-reform period; the omitted category is cities with population above 5 million, where hukou regulations remained largely unchanged. All regressions include baseline city-level controls (log GDP and log of the tertiary sector's share in GDP), interactions between baseline city-level controls and a linear time trend, city fixed effects and year fixed effects. Standard errors clustered at the city level are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 10: Impact of the Hukou Reform on the Employment in Non-Skill-Intensive and Skill-Intensive Industries

	(1)	(2)
	Log (Number of employees in Non-Skill-Intensive industries)	Log (Number of employees in Skill-Intensive industries)
Treat (3-5 million) *Post	0.0057	-0.0322
	(0.0587)	(0.0422)
Treat (1-3 million) *Post	0.0922	-0.0157
	(0.0691)	(0.0461)
Treat (0.5-1 million) *Post	0.1013	0.0007
	(0.0778)	(0.0504)
Treat (<0.5 million) *Post	0.1726**	0.0108
	(0.0862)	(0.0557)
City-level controls(pre-policy)	Yes	Yes
City-level control*Time trend	Yes	Yes
City FE	Yes	Yes
Year FE	Yes	Yes
N	2,823	2,823
R^2	0.9707	0.9922

NOTE. —This table reports estimates of equation (1) using a panel of prefecture-level cities from the China City Statistical Yearbook, 2000-2019. The dependent variables are the log number of employees in non-skill-intensive industries (column 1) and the log number of employees in skill-intensive industries (column 2). Following Chen, Han and Han (2022) and Huang and Wang (2021), skill-intensive industries include manufacturing, information transmission, software and IT services, scientific research and technical services, education, and health and social work; all remaining industries are classified as non-skill-intensive. "Treat (3-5 million) *Post", "Treat (1-3 million) *Post", "Treat (0.5-1 million) *Post", and "Treat (<0.5 million) *Post" are interaction terms between city-size treatment groups and the post-reform period; the omitted category is cities with population above 5 million, where hukou regulations remained largely unchanged. All regressions include baseline city-level controls (log GDP and log of the tertiary sector's share in GDP), interactions between baseline city-level controls and a linear time trend, city fixed effects and year fixed effects. Standard errors clustered at the city level are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 11: Impact of the Hukou Reform on Employment in Female-Preferred, Gender-Balanced, and Male-Preferred Industries

	(1)	(2)	(3)
	Log (Number of employees in female-preferred industries)	Log (Number of employees in gender-balanced industries)	Log (Number of employees in male-preferred industries)
Treat (3-5 million) *Post	0.1480	0.1128	0.0429
	(0.1174)	(0.1033)	(0.0967)
Treat (1-3 million) *Post	0.1465*	0.1580	0.1034
	(0.0792)	(0.0988)	(0.0994)
Treat (0.5-1 million) *Post	0.2025**	0.1719*	0.0758
	(0.0875)	(0.0948)	(0.1084)
Treat (<0.5 million) *Post	0.2405**	0.2562**	0.1511
	(0.0941)	(0.1062)	(0.1160)
City-level controls(pre-policy)	Yes	Yes	Yes
City-level control*Time trend	Yes	Yes	Yes
City FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	2,873	2,873	2,873
R^2	0.9539	0.9663	0.9575

NOTE. —This table reports estimates of equation (1) using a panel of prefecture-level cities from the China City Statistical Yearbook, 2000-2019. Industries are grouped into three categories according to the gender composition of employment documented in Yang and Zhang (2019) and Wei (2015): female-preferred industries (female employment share above 50%), gender-balanced industries (female share between 40% and 49.9%), and male-preferred industries (female share below 40%). The dependent variables are the log number of employees in female-preferred industries (column 1), gender-balanced industries (column 2), and male-preferred industries (column 3). "Treat (3-5 million) *Post", "Treat (1-3 million) *Post", "Treat (0.5-1 million) *Post", and "Treat (<0.5 million) *Post" are interaction terms between city-size treatment groups and the post-reform period; the omitted category is cities with population above 5 million, where hukou regulations remained largely unchanged. All regressions include baseline city-level controls (log GDP and log of the tertiary sector's share in GDP), interactions between baseline city-level controls and a linear time trend, city fixed effects and year fixed effects. Standard errors clustered at the city level are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

5.4 Discussion: Why We Do Not Observe Displacement of Low-Educated Local Women

The baseline results and mechanism analysis together point to a somewhat counterintuitive pattern: low-educated local women, who, under standard immigration-competition frameworks, are typically viewed as the group most exposed to adverse shocks, do not exhibit clear signs of displacement in our institutional setting. Instead, they

experience meaningful improvements in employment probabilities, working hours, and (in some city groups) wages. This finding stands in contrast to parts of the international literature that emphasise the displacement of low-skilled natives by low-skilled migrants and differs from common public concerns in the Chinese context. It is therefore necessary, building on the mechanism evidence, to provide a more focused discussion of this pattern.

On the supply side, individual- and household-level results from CHFS show that, after the hukou reform, local women in small and medium-sized cities, especially low-educated women, are more likely to enter relatively stable occupations, and their households are more likely to use domestic services and increase related expenditures. By contrast, men and high-education households do not display the same pattern of change. Combined with the CMDS evidence of rising shares of migrants employed in low-skilled service sectors, this set of findings is consistent with an interpretation whereby low-skilled migrants expand the supply of domestic and low-end service jobs, and low-educated local women respond by outsourcing part of their housework and adjusting their job choices to increase their labour supply. In this interpretation, low-skilled migrants fill some of the low-end service positions previously held by marginal local workers and reduce the effective cost of purchasing domestic services, allowing local women to deepen their labour-market participation without substantially increasing the burden on the household.

On the demand side, results from the China City Statistical Yearbook indicate that small and medium-sized cities with larger relaxations of hukou restrictions experienced faster economic growth and stronger population agglomeration after the reform. Employment in non-skill-intensive industries, as well as in female-preferred and gender-balanced industries, increased significantly, whereas changes in male-preferred industries were relatively limited. Combined with the findings of Liu, Xu and Zou (2024), who use enterprise registration data to show that the 2014 hukou reform significantly raised entrepreneurial activity and the number of firms in reform regions, especially in services and small and micro enterprises, and with other studies using the same policy that document improvements in urban economic dynamism and employment capacity, these external pieces of evidence are consistent with our city-level results and indicate that demand for low-skilled and service-oriented labour in small and medium-sized cities did in fact expand after the reform.

Taken together, the supply-side and demand-side evidence suggest a cautious interpretation: although low-skilled migrants and low-educated local women occupy similar positions along the education distribution, their sectoral distribution, job types, and task content do not fully overlap. On the one hand, incoming low-skilled migrants are more concentrated in low-skilled service sectors and household and personal service jobs; on the other hand, in a context of urban economic expansion and employment growth in service sectors, especially female-preferred industries, low-educated local women are better able to use newly created positions and expanded domestic-service supply to move out of unstable, low-return jobs or unpaid housework and into more stable, formally protected employment. The combined net effect of these processes is an improvement in the labour-market outcomes of low-educated local women, rather than simple quantitative displacement.

It is important to emphasise that this discussion does not imply that one can directly conclude the existence of a structural complementarity between low-skilled migrants and low-educated local women. In the absence of data at the task, occupation, or firm-worker matching level, we cannot directly observe the degree of substitution or complementarity between migrants and locals in specific jobs and tasks, nor can we decompose newly created positions into portions filled by migrants versus locals. The interpretation offered in this subsection should therefore be viewed as a possible mechanism that is consistent with the available supply-side and demand-side

evidence, rather than as a fully verified factual statement.

6 Conclusion

This paper takes the State Council's 2014 Opinions on Further Promoting the Reform of the Household Registration (Hukou) System as its institutional background and treats this round of hukou reform, characterised by a city-size-based classification of permanent urban populations and a systematic relaxation of settlement thresholds outside megacities, as a quasi-natural experiment that loosened internal migration constraints. Building on this, we combine multiple data sources, the China Migrants Dynamic Survey (CMDS), the China Household Finance Survey (CHFS), and the China City Statistical Yearbook, and construct a multi-intensity difference-in-differences (DID) framework to examine how inflows of low-skilled (proxied by low-educated) migrants affect the labour-market outcomes of urban local registered residents. We then conduct a systematic heterogeneity and mechanism analysis along gender and education dimensions.

First, city-year level analysis based on CMDS shows that, after controlling for city fixed effects, year fixed effects, and pre-reform baseline city economic characteristics, the 2014 hukou reform significantly altered the educational composition of migrants in non-megacities. Relative to cities with an urban district population exceeding 5 million, where settlement rules remained largely unchanged, cities with populations of 3-5 million, 1-3 million, 0.5-1 million, and below 0.5 million all experienced an increase in the share of low-educated migrants after the reform, while the share of highly educated migrants changed relatively little. This pattern is consistent with the institutional design of relaxing hukou thresholds mainly in small and medium-sized cities, and with findings in the existing literature that hukou barriers bind more tightly for low-educated rural migrants, whereas highly educated migrants already had more settlement channels before the reform (Meng and Zhang, 2010; An et al., 2024; Liu, Xu and Zou, 2024). Taken together, this first-stage evidence provides empirical support for viewing the 2014 hukou reform as an institutional shock that primarily operates through the inflow of low-skilled migrants.

Second, using the CHFS sample of urban local registered residents, we construct city-year level multi-intensity treatment variables and estimate panel DID models with city and year fixed effects to analyse the impact of the reform on local registered residents' employment probability, working hours, and wage levels. The baseline full-sample results indicate that, relative to megacities, small and medium-sized cities that experienced larger relaxations of settlement thresholds saw robust increases in the employment probability and working hours of local registered residents after the reform, while positive wage effects were mainly concentrated in those city groups with relatively strong reform intensity. Event-study plots and placebo tests further show no evidence of systematic pre-trends in labour-market indicators across different city groups before the reform, and random re-assignment of the policy dummy does not reproduce the main results, patterns that are broadly consistent with the validation of the parallel-trends assumption in other studies based on the same reform (An et al., 2024). Overall, within the institutional context and sample frame of this study, the relaxation of internal migration constraints via hukou reform did not lead to systematic displacement of urban local registered residents in terms of employment or working hours; instead, it was accompanied by a certain degree of improvement.

Third, we incorporate gender and education (as a proxy for skill) into the analytical framework and conduct subgroup regressions of labour-market outcomes for local registered residents. The results show that, when estimating separately by gender, the effects of the reform on employment and working hours are generally more

pronounced among women. When estimating separately by education, the effects on employment and working hours are more pronounced among low-educated groups. Further splitting by education within gender, and by gender within education, we find that the improvements in employment probability and working hours are most pronounced among low-educated women, with positive wage effects mainly concentrated in small and medium-sized city groups.

Fourth, on the mechanism side, we provide a set of pieces of evidence from both the supply side and the demand side. On the supply side, individual-level results indicate that, after the reform, the share of urban local registered residents, especially women employed in relatively stable occupations, increased in treatment cities. At the household level, conditional on household characteristics, some household types show signs of an increased probability of using domestic services and higher domestic-service expenditures after the reform. The former is consistent with the view in the internal-migration literature that migrants can affect native occupational matching by reshaping firms' employment and job structures (Meng and Zhang, 2010; An et al., 2024). And the latter resonates with the research by Cortés and Tessada (2011) and by Dong and An (2015) and Qi and Dong (2016) on the housework outsourcing–time reallocation mechanism and the domestic work burden of urban women in China. Existing studies show that urban Chinese women generally bear a heavy load of unpaid housework and care work, that this burden interferes with their paid work and earnings, and that the development of household outsourcing and domestic service markets may create room for such time reallocation. The pattern documented in this paper, where low-skilled migrant inflows, rising household service expenditures, and increases in female labour supply emerge simultaneously in small and medium-sized cities, can be interpreted as indirect evidence consistent with this housework outsourcing–time reallocation mechanism.

On the demand side, analysis based on the China City Statistical Yearbook shows that, after the reform, employment in labour-intensive sectors, service-intensive sectors, and sectors with a high female employment share or a more gender-balanced workforce expanded to varying degrees in treatment cities. This is directionally consistent with evidence from Liu, Xu and Zou (2024), who, using enterprise registration data, find that hukou reform significantly stimulated entrepreneurship and employment expansion in labour-intensive sectors. Due to data limitations, we cannot directly identify complementarities or substitutability between migrants and local workers at the task or firm level and thus can only interpret the supply-side and demand-side channels documented above as possible mechanisms consistent with the results.

Fifth, combining the existing literature with our findings allows for several more general reflections on the relationship between internal migration, the hukou system, and local labour markets. In the international migration literature, Borjas (2003) emphasises the competitive effect of immigration through increased low-skilled labour supply and downward pressure on the wages of low-skilled natives, whereas Dustmann, Frattini and Preston (2013) highlight substantial distributional heterogeneity in the effects of immigration across the native wage distribution. In the Chinese internal migration literature, Meng and Zhang (2010) use large-scale census data to show that rural-urban migration has limited average effects on the employment and wages of urban local workers overall, but that there is some competitive pressure among low-skilled local workers. Against this backdrop, our evidence based on the 2014 hukou reform and a multi-intensity DID design suggests that, under an institutional environment featuring substantial relaxation of hukou thresholds, ongoing industrial upgrading, and continued development of domestic and personal service sectors, inflows of low-skilled migrants do not, on the whole, significantly displace local low-educated residents—especially low-educated women—from employment or working hours; instead, these inflows coincide with improvements in their labour-market outcomes. Together with Ye et al. (2024), who

show that hukou reform increases educational investment in migrant children, and Liu, Xu and Zou (2024), who document reform-induced entrepreneurship and employment expansion, our findings provide positive evidence on whether relaxing migration restrictions can foster more inclusive urbanisation and human-capital accumulation. At the same time, they suggest that, under different institutional environments and city types, the relationship between low-skilled migrants and low-skilled local workers may be more complex than a simple competition-displacement framework.

Sixth, from a policy perspective, our findings have several implications for understanding and optimising the future trajectory of hukou reform and population urbanisation. First, building on existing evidence that hukou reform improves migrant household welfare (such as children's educational investment) and promotes firm entry and employment expansion (Ye et al., 2024; Liu, Xu and Zou, 2024), this paper further shows that, within appropriate city-size ranges and industrial-structure conditions, relaxing settlement thresholds does not necessarily harm the labour-market interests of urban local registered residents, especially low-educated women. On the contrary, it may foster mutual gains for locals and migrants by expanding labour demand, improving job matching, and easing family care constraints. Second, from the perspective of gender equality and human-capital utilisation, hukou reform, if coordinated with policies on public childcare provision, formalisation and regulation of domestic services, and vocational training, is more likely to unlock the labour-supply potential of local women, particularly low-educated women, and thereby enhance both efficiency and equity in urban labour markets. Existing research has already documented that urban women in China devote substantially more time than men to unpaid care work, and that this time burden distorts their paid work and income outcomes (Dong and An, 2015; Qi and Dong, 2016). Our findings provide additional empirical support for policy proposals aimed at alleviating women's family-care constraints through institutional and market arrangements.

Finally, this study has several limitations that point to directions for future research. First, we use education as a proxy for skill but lack information on workers' detailed task assignments and job content within firms, which prevents direct testing of task-based complementarity/substitution mechanisms. Future work combining job-level or employer-level microdata would help identify matching patterns between low-skilled migrants and low-educated local women at a finer granularity. Second, although CHFS provides rich household and individual-level variables, information on hukou migration histories is only available in some years and for part of the sample, and missing values remain an issue. This introduces uncertainty in identifying earlier in-migrants who have already completed hukou transfers. We partially address this concern by conducting robustness checks on the subsample of respondents who report never having migrated their hukou, but future work using data with longer coverage and more complete migration histories would be advantageous. Third, this paper primarily focuses on the short- to medium-term effects in the years following the 2014 reform and is unable to track the longer-term dynamics of the interaction between low-skilled migrant inflows and local labour markets. Against the backdrop of ongoing urbanisation and rapid population ageing, longer-run effects and their intergenerational transmission mechanisms merit continued investigation.

Overall, our evidence suggests that, within China's specific hukou regime and evolving industrial structure, relaxing internal migration restrictions and admitting more low-skilled migrants into cities does not necessarily come at the expense of local low-educated workers, especially local low-educated women, in terms of labour-market outcomes. On the contrary, under appropriate policy design and complementary measures, this process may jointly advance multiple objectives: urban economic growth, migrant urban integration, and improved labour-market opportunities for disadvantaged local groups. This conclusion not only enriches the empirical

literature on the relationship between immigration and local labour markets but also provides an empirical reference for further promoting new-type urbanisation and deepening hukou reform in China.

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Appendix-Figure

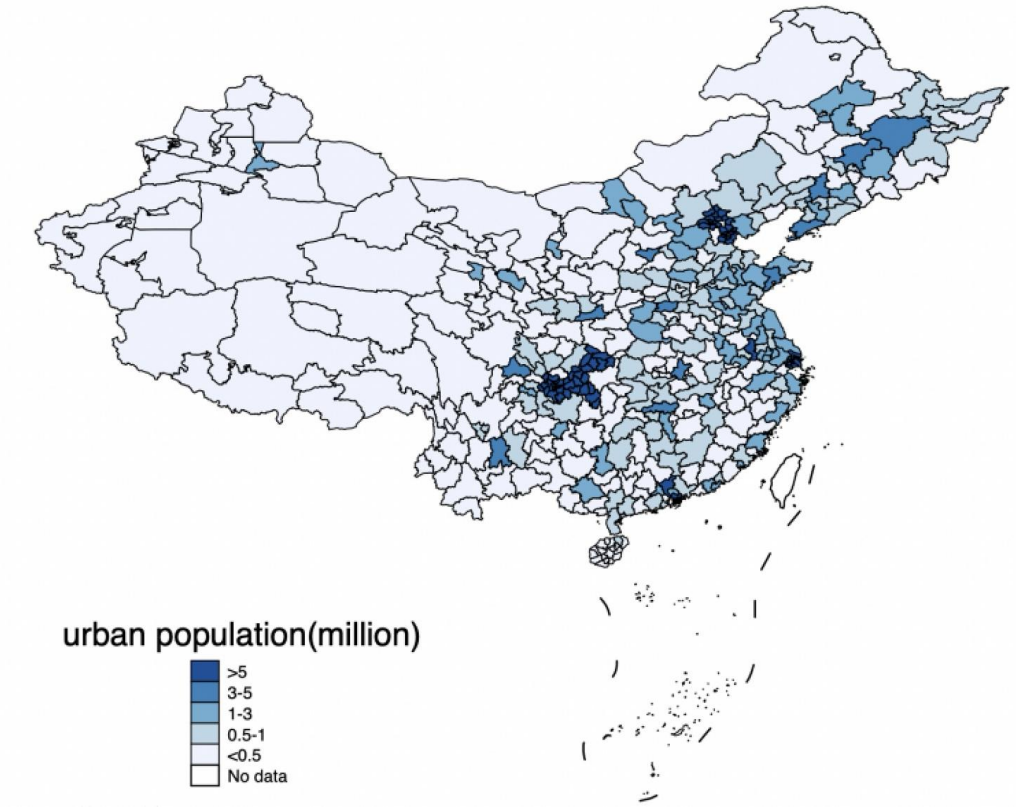


Figure 1. City Tiers by Urban Population under the 2014 Hukou Reform

NOTE. —The map shows all sample prefecture-level cities categorised into five tiers according to their 2014 urban population. Darker shading indicates larger cities: above 5 million, 3–5 million, 1–3 million, 0.5–1 million, and below 0.5 million residents. Cities with an urban population above 5 million constitute the control group (no relaxation of hukou admission), while the remaining four tiers form Treatment Groups 1–4 and are used to construct the multi-intensity treatment indicators in the empirical analysis. Cities shaded in white with no data are not included in the estimation sample.

Panel A. Whether is Low-education

Panel B. Whether Working in Low-skilled Service Sectors

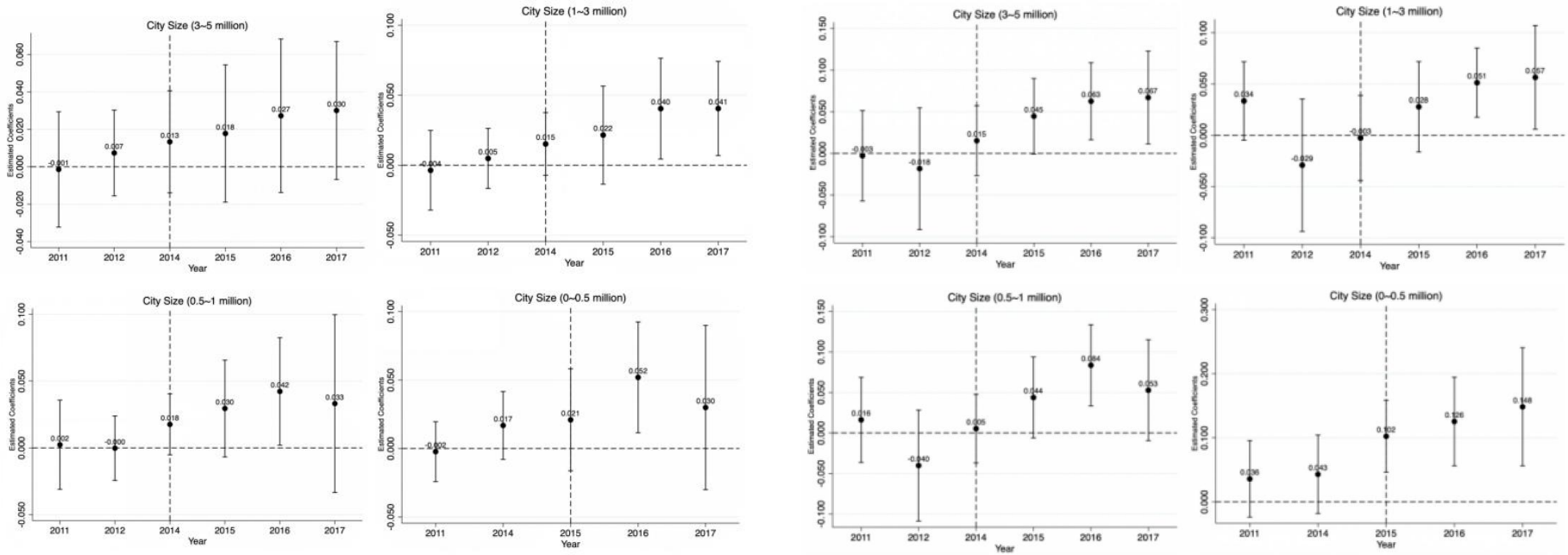


Figure 2. Event-Study Estimates of the Hukou Reform on the Composition of Migrants

NOTE. —Panels A–B plot event-study coefficients for the impact of the hukou reform on the composition of migrants, using equation (1) estimated separately by city-size treatment group. Panel A shows results for the probability that a migrant is low-educated, and Panel B for the probability of working in low-skilled service sectors. In each panel, the markers represent the estimated coefficients for each survey year relative to 2013 (the omitted pre-reform year), and the vertical bars indicate 95% confidence intervals. The vertical dashed line marks the timing of the hukou reform in 2014. All specifications include baseline city-level controls, interactions between baseline city-level controls and a linear time trend, city fixed effects, and year fixed effects, with standard errors clustered at the city level.

Panel A. Whether has a Job

Panel B. Work Hours

Panel C. Log (wage)

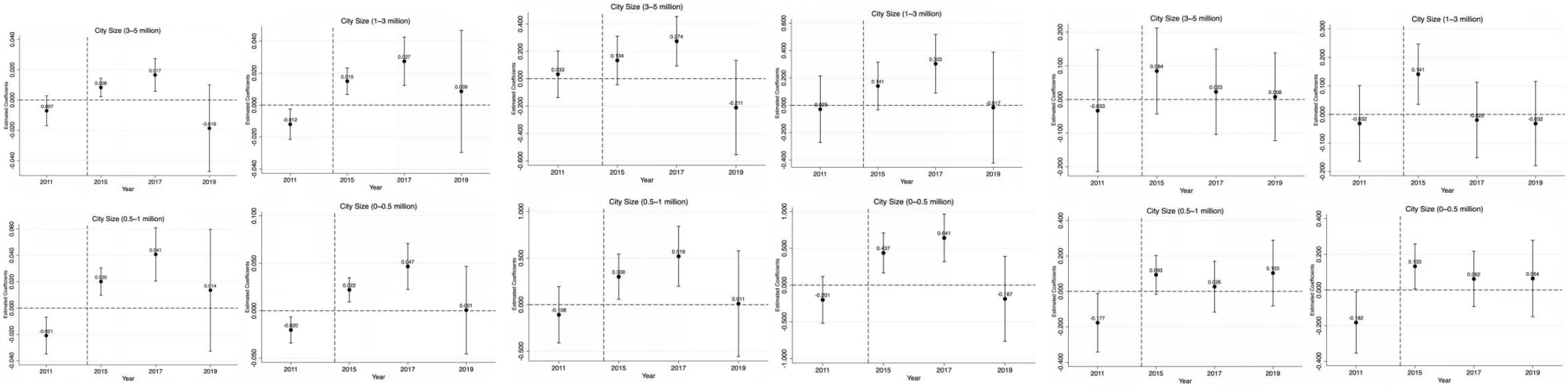
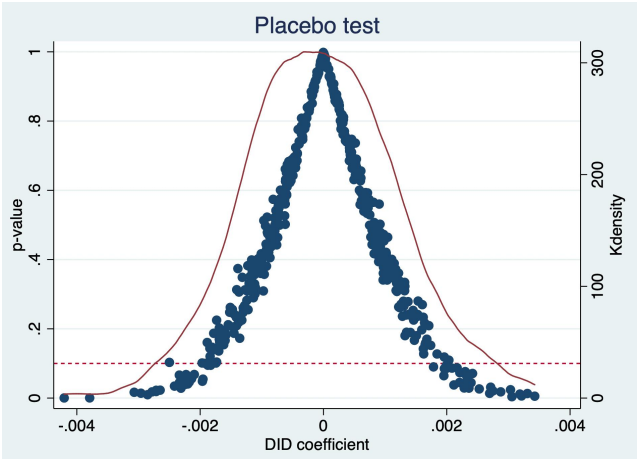


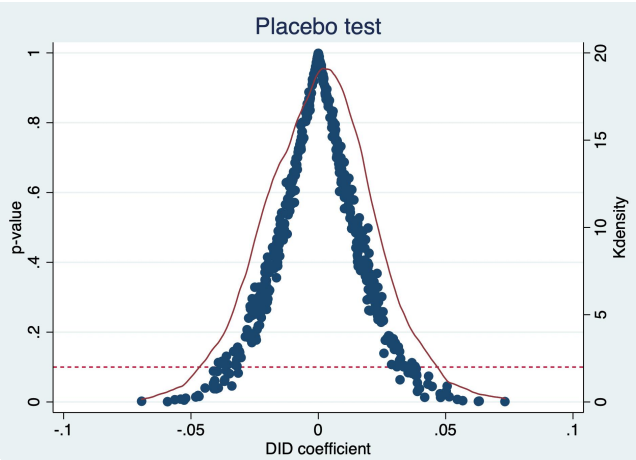
Figure 3. Event-Study Estimates of the Hukou Reform on Labour Market Outcomes of Urban Local Registered Residents

NOTE. —Panels A-C plot event-study coefficients for the impact of the hukou reform on labour market outcomes of urban local registered residents, using equation (2) estimated separately by city-size treatment group. Panel A shows results for the probability of having a job, Panel B for daily working hours, and Panel C for the log of monthly labour wage after tax. In each panel, the markers represent the estimated coefficients for each survey year relative to 2013 (the omitted pre-reform year), and the vertical bars indicate 95% confidence intervals. The vertical dashed line marks the timing of the hukou reform in 2014. All specifications include individual-level controls, baseline city-level controls, interactions between baseline city-level controls and a linear time trend, city fixed effects, and year fixed effects, with standard errors clustered at the city level.

Panel A. Whether has a Job



Panel B. Work Hours



Panel C. Log(wage)

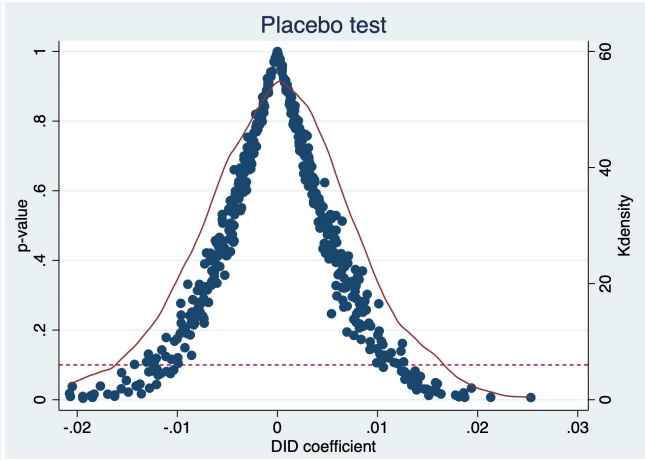


Figure 4. Permutation-Based Placebo Tests for Baseline DID Estimates

NOTE. —Panels A-C present permutation-based placebo tests for the baseline difference-in-differences estimates of the hukou reform. For each outcome, we randomly permute the treatment status across cities while keeping the number of treated cities in each city-size group unchanged, re-estimate equation (2), and repeat this procedure 500 times to obtain the empirical distribution of placebo DID coefficients. Panel A corresponds to the probability of having a job, Panel B to daily working hours, and Panel C to the log of monthly labour wage after tax. The blue dots display the placebo DID coefficients and the associated empirical p-values, while the solid curve depicts the kernel density of the placebo distribution. The vertical dotted line indicates the actual DID estimate from the true policy intervention. The fact that the true estimate lies in the extreme right tail of the placebo distribution suggests that the baseline results are unlikely to be driven by random noise.

Appendix-Table

Table A1: Summary Statistics of Key variables: CMDS

Variable	Full sample		Before		After		Difference (After-Before)	Two-sample t test
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.		
	A. All cities							
Male	.583	.493	.591	.492	.573	.495	-0.018	***
Age	33.773	9.178	33.205	8.956	34.546	9.416	1.341	***
Married	.775	.417	.758	.428	.798	.401	0.04	***
Low_edu(≤High school)	.87	.336	.895	.307	.837	.369	-0.058	***
Low-skilled Service	.572	.495	.563	.496	.584	.493	0.021	***
Obs	711809	711809	410200	410200	301609	301609		
	B. Treatment cities							
Male	.59	.492	.598	.49	.578	.494	-0.02	***
Age	33.766	9.201	33.258	8.997	34.51	9.441	1.252	***
Married	.772	.42	.756	.429	.795	.404	0.039	***
Low_edu(≤High school)	.891	.312	.907	.291	.867	.34	-0.04	***
Low-skilled Service	.575	.494	.563	.496	.592	.492	0.029	***
Obs	554183	554183	329045	329045	225138	225138		
	C. Control cities							
Male	.562	.496	.565	.496	.559	.496	-0.006	**
Age	33.797	9.098	32.99	8.787	34.653	9.341	1.663	***
Married	.787	.409	.766	.423	.809	.393	0.043	***
Low_edu(≤High school)	.798	.401	.845	.362	.749	.434	-0.096	***
Low-skilled Service	.561	.496	.56	.496	.561	.496	0.001	-
Obs	157626	157626	81155	81155	76471	76471		

NOTE. —This table reports summary statistics for key variables from the China Migrants Dynamic Survey (CMDS), 2011-2017. Panel A uses the full CMDS sample of working-age migrants (16-65) in all cities; Panel B restricts the sample to treatment cities (those with city size below 5 million); Panel C restricts the sample to control cities (city size above 5 million). Before refers to survey years prior to the hukou reform (2011 and 2014), and after refers to survey years following the reform (2015 and 2017). Male is a dummy equal to one for male migrants. Age is measured in years. Married is a dummy equal to one for currently married migrants. Low_edu (≤High school) is a dummy equal to one for migrants with at most high-school education. Low-skilled Service is a dummy equal to one for migrants employed in low-skilled service occupations. Difference (After-Before) reports the difference in means between the post-reform and pre-reform periods. The last column reports p-values from two-sample t-tests for equality of means across periods. Obs denotes the number of observations in each sample.

Table A2: Summary Statistics of Key variables: CHFS

	Full sample		Before		After		Difference	Two-sample
Variable	Mean	Std.	Mean	Std.	Mean	Std.	(After-Before)	t test
	Treatment group							
Female	.437	.496	.42	.494	.443	.497	0.023	***
Age	41.004	10.235	39.576	9.802	41.486	10.333	1.91	***
Married	.837	.369	.844	.363	.835	.371	-0.009	**
The number of children	.532	.673	.53	.621	.533	.69	0.003	-
The number of old	.256	.568	.215	.518	.27	.584	0.055	***
Years of education	12.644	3.334	12.611	3.226	12.656	3.37	0.045	-
High edu	.242	.428	.224	.417	.248	.432	0.024	***
Whether has a job	.965	.183	.999	.013	.954	.21	-0.046	***
Working hours per day	8.093	2.737	8.167	2.329	8.076	2.825	-0.091	**
Individual wage per month	7.913	.915	7.801	.838	7.949	.936	0.148	***
Household total wage	10.899	.966	10.725	.94	10.954	.968	0.229	***
Household total income	11.277	1.136	11.077	1.09	11.328	1.142	0.251	***
Obs	49812	49812	12589	12589	37223	37223		
	Control group							
Female	.432	.495	.421	.494	.436	.496	0.015	*
Age	40.45	10.443	39.526	10.173	40.776	10.517	1.25	***
Married	.815	.388	.826	.379	.811	.392	-0.015	**
The number of children	.462	.61	.425	.557	.475	.627	0.05	***
The number of old	.27	.591	.201	.513	.295	.614	0.094	***
Years of education	13.839	3.153	13.96	3.103	13.796	3.169	-0.164	***
High edu	.369	.483	.371	.483	.369	.483	-0.002	-
Whether has a job	.98	.14	.999	.014	.973	.162	-0.027	***
Working hours per day	8.229	2.262	8.264	1.928	8.22	2.34	-0.044	-
Individual wage per month	8.336	.999	8.323	.942	8.341	1.017	0.018	-
Household total wage	11.329	1.049	11.277	1.015	11.347	1.059	0.07	***
Household total income	11.771	1.086	11.625	1.084	11.811	1.083	0.186	***
Obs	20117	20117	5242	5242	14875	14875		

NOTE. —This table reports summary statistics for key variables from the China Household Finance Survey (CHFS), 2011, 2013, 2015, 2017 and 2019. The sample is restricted to urban local registered residents aged 16-65. Panel A reports statistics for treatment cities (city size below 5 million); Panel B reports statistics for control cities (city size above 5 million). Before refers to the pre-reform period (2011 and 2013), and after refers to the post-reform period (2015, 2017 and 2019). Female is a dummy equal to one for women. Age is measured in years. Married is a dummy equal to one for currently married respondents. The number of children and The number of old denote the number of children and elderly members in the household. Years of education is years of schooling. High_edu is a dummy equal to one for respondents with college education and above. Whether has a job is a dummy equal to one for being employed. Working hours per day is average daily working hours. Individual wage per month is monthly labour wage after tax. Household total wage and Household total income are the sum of labour income and total income at the household level. Difference (After-Before) reports the difference in means between the post-reform and pre-reform periods. The last column reports p-values from two-sample t-tests for equality of means across periods. Obs denotes the number of observations in each sub-sample.

Table A3: Impact of the Hukou Reform on the Labour Market Outcomes of Urban Local Registered Residents Men (Education Heterogeneity)

	High Education Male			Low Education Male		
	(1)	(2)	(3)	(4)	(5)	(6)
	Job	Work hours	Log(Wage)	Job	Work hours	Log(Wage)
Treat (3-5 million) *Post	-0.0027	-0.0577	0.1344**	-0.0065	-0.0497	-0.0037
	(0.0047)	(0.1700)	(0.0634)	(0.0052)	(0.1650)	(0.0620)
Treat (1-3 million) *Post	0.0028	0.0737	0.0867	0.0055	0.0901	0.0149
	(0.0056)	(0.1421)	(0.0662)	(0.0053)	(0.1160)	(0.0584)
Treat (0.5-1 million) *Post	0.0147**	0.5078**	0.1130	0.0078	0.1590	0.0705
	(0.0072)	(0.2275)	(0.0817)	(0.0066)	(0.1781)	(0.0610)
Treat (<0.5 million) *Post	0.0094	0.5230*	0.0638	0.0052	0.1643	0.1334*
	(0.0077)	(0.2685)	(0.1022)	(0.0069)	(0.1881)	(0.0724)
Individual-level controls	Yes	Yes	Yes	Yes	Yes	Yes
City-level controls(pre-policy)	Yes	Yes	Yes	Yes	Yes	Yes
City-level control*Time trend	Yes	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	10,588	9,097	8,450	28,831	21,705	20,648
R^2	0.0665	0.0484	0.2224	0.1079	0.0447	0.1549

NOTE. —This table reports estimates of equation (2) using the 2011, 2013, 2015, 2017 and 2019 waves of the China Household Finance Survey (CHFS). The sample is restricted to urban local registered men aged 16-65. Columns (1)-(3) use the high-education male sub-sample (college degree and above); columns (4)-(6) use the low-education male sub-sample (below college). The dependent variables are a dummy for having a job (columns 1 and 4), daily working hours (2 and 5), and the log of monthly labour wage after tax (3 and 6). "Treat (3-5 million) *Post", "Treat (1-3 million) *Post", "Treat (0.5-1 million) *Post", and "Treat (<0.5 million) *Post" are interaction terms between city-size treatment groups and the post-reform period; the omitted category is cities with population above 5 million. All regressions include individual-level controls (age, marital status, number of children, number of elderly household members), baseline city-level controls (log GDP and log of the tertiary sector's share in GDP), interactions between baseline city-level controls and a linear time trend, city fixed effects and year fixed effects. Standard errors clustered at the city level are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A4: Summary Statistics of Urban Hukou Movers by Timing of Hukou Change

	Full sample		Move time>2014		1956≤Move time≤2014		2000≤Move time≤2014		2010≤Move time≤2014	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Male	.529	.499	.516	.5	.532	.499	.487	.5	.466	.499
Age	40.675	9.314	38.03	9.294	41.218	9.225	37.639	8.366	35.925	8.394
Married	.874	.332	.864	.343	.876	.33	.859	.349	.83	.376
Years of education	13.916	3.234	14.151	3.17	13.868	3.245	14.283	3.247	14.548	3.106
High_edu	.408	.491	.443	.497	.401	.49	.471	.499	.509	.5
Obs	9337	9337	1589	1589	7748	7748	4171	4171	1072	1072

NOTE. —This table reports summary statistics for respondents in the 2019 wave of the China Household Finance Survey (CHFS) who report having ever changed their household registration (hukou). The sample is restricted to urban hukou holders (and to the working-age population in the main analysis). Male is a dummy equal to one for male respondents. Age is measured in years. Marriage is a dummy equal to one for currently married respondents. Years of education denotes years of schooling. High_edu is a dummy equal to one for respondents with college education and above (high education). Full sample includes all hukou movers; the remaining columns split hukou movers by the reported timing of hukou change moves occurring after 2014, between 1956 and 2014, between 2000 and 2014, and between 2010 and 2014. Means and standard deviations are reported in each column. Obs indicates the number of observations in each group.

Table A5: Impact of the Hukou Reform on Labour Market Outcomes of the Native

	(1)	(2)	(3)
	Job	Work hours	Log (Wage)
Treat (3-5 million) *Post	0.0098*	0.5077***	0.0572
	(0.0053)	(0.1296)	(0.0572)
Treat (1-3 million) *Post	0.0294***	0.7361***	-0.0542
	(0.0072)	(0.1591)	(0.0595)
Treat (0.5-1 million) *Post	0.0425***	1.0021***	0.0494
	(0.0098)	(0.1981)	(0.0660)
Treat (<0.5 million) *Post	0.0431***	1.2697***	0.1100
	(0.0104)	(0.2149)	(0.0708)
Individual-level controls	Yes	Yes	Yes
City-level controls(pre-policy)	Yes	Yes	Yes
City-level controls * Time trend	Yes	Yes	Yes
City FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	34,070	27,902	24,934
R^2	0.1485	0.0935	0.2256

NOTE. —This table reports estimates of equation (2) using the 2011, 2013, 2015, 2017 and 2019 waves of the China Household Finance Survey (CHFS). The sample is restricted to the natives (Never changed Hukou) aged 16-65. The dependent variables are a dummy for having a job (column 1), daily working hours (2), and the log of monthly labour wage after tax (3). "Treat (3-5 million) *Post", "Treat (1-3 million) *Post", "Treat (0.5-1 million) *Post", and "Treat (<0.5 million) *Post" are interaction terms between city-size treatment groups and the post-reform period; the omitted category is cities with population above 5 million. All regressions include individual-level controls (gender, age, marital status, years of schooling, number of children and number of elderly household members), baseline city-level controls (log GDP and log of the tertiary sector's share in GDP), interactions between baseline city-level controls and a linear time trend, city fixed effects and year fixed effects. Standard errors clustered at the city level are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A6: Impact of the Hukou Reform on the Labour Market Outcomes of the Native (Gender Heterogeneity)

	Male			Female		
	(1)	(2)	(3)	(4)	(5)	(6)
	Job	Work hours	Log(Wage)	Job	Work hours	Log(Wage)
Treat (3-5 million) *Post	-0.0077	0.2112	0.0419	0.0291***	0.8915***	0.0743
	(0.0058)	(0.1888)	(0.0575)	(0.0109)	(0.2467)	(0.0825)
Treat (1-3 million) *Post	0.0083	0.5311**	-0.0411	0.0537***	0.9709***	-0.0680
	(0.0057)	(0.2166)	(0.0668)	(0.0144)	(0.2848)	(0.0858)
Treat (0.5-1 million) *Post	0.0118*	0.6136**	0.0728	0.0750***	1.4083***	0.0064
	(0.0071)	(0.2745)	(0.0725)	(0.0200)	(0.3494)	(0.0946)
Treat (<0.5 million) *Post	0.0069	0.9390***	0.1823**	0.0874***	1.6730***	-0.0074
	(0.0068)	(0.2937)	(0.0873)	(0.0220)	(0.3677)	(0.0977)
Individual-level controls	Yes	Yes	Yes	Yes	Yes	Yes
City-level controls(pre-policy)	Yes	Yes	Yes	Yes	Yes	Yes
City-level control*Time trend	Yes	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	19,968	16,210	14,926	14,081	11,674	9,988
R^2	0.1002	0.0519	0.2129	0.2116	0.1572	0.2434

NOTE. —This table reports estimates of equation (2) using the 2011, 2013, 2015, 2017 and 2019 waves of the China Household Finance Survey (CHFS). The sample is restricted to the natives (Never changed Hukou) aged 16-65. Columns (1)-(3) use the male sub-sample; columns (4)-(6) use the female sub-sample. The dependent variables are a dummy for having a job (columns 1 and 4), daily working hours (2 and 5), and the log of monthly labour wage after tax (3 and 6). "Treat (3-5 million) *Post", "Treat (1-3 million) *Post", "Treat (0.5-1 million) *Post", and "Treat (<0.5 million) *Post" are interaction terms between city-size treatment groups and the post-reform period; the omitted category is cities with population above 5 million. All regressions include individual-level controls (gender is dropped in sub-sample regressions), baseline city-level controls (log GDP and log of the tertiary sector's share in GDP), interactions between baseline city-level controls and a linear time trend, city fixed effects and year fixed effects. Standard errors clustered at the city level are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A7: Impact of the Hukou Reform on the Labour Market Outcomes of the Native (Education Heterogeneity)

	High Education			Low Education		
	(1)	(2)	(3)	(4)	(5)	(6)
	Job	Work hours	Log (Wage)	Job	Work hours	Log (Wage)
Treat (3-5 million) *Post	0.0052	0.5570*	0.1793	0.0056	0.4095**	0.0215
	(0.0066)	(0.3151)	(0.1126)	(0.0055)	(0.1681)	(0.0567)
Treat (1-3 million) *Post	0.0120	0.5415**	0.0530	0.0264***	0.7143***	-0.0816
	(0.0087)	(0.2659)	(0.0836)	(0.0073)	(0.1824)	(0.0608)
Treat (0.5-1 million) *Post	0.0168	0.9743**	-0.0295	0.0403***	0.9183***	0.0687
	(0.0103)	(0.4125)	(0.1006)	(0.0104)	(0.2029)	(0.0658)
Treat (<0.5 million) *Post	0.0226*	1.2398***	-0.0246	0.0378***	1.1271***	0.1400*
	(0.0127)	(0.3835)	(0.0995)	(0.0110)	(0.2424)	(0.0751)
Individual-level controls	Yes	Yes	Yes	Yes	Yes	Yes
City-level controls(pre-policy)	Yes	Yes	Yes	Yes	Yes	Yes
City-level control*Time trend	Yes	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	7,859	7,166	6,452	26,194	20,722	18,467
R^2	0.0872	0.0696	0.2284	0.1661	0.1130	0.1696

NOTE. —This table reports estimates of equation (2) using the 2011, 2013, 2015, 2017 and 2019 waves of the China Household Finance Survey (CHFS). The sample is restricted to the natives (Never changed Hukou) aged 16-65. Columns (1)-(3) use the high-education sub-sample (college degree and above); columns (4)-(6) use the low-education sub-sample (below college). The dependent variables are a dummy for having a job (columns 1 and 4), daily working hours (2 and 5), and the log of monthly labour wage after tax (3 and 6). "Treat (3-5 million) *Post", "Treat (1-3 million) *Post", "Treat (0.5-1 million) *Post", and "Treat (<0.5 million) *Post" are interaction terms between city-size treatment groups and the post-reform period; the omitted category is cities with population above 5 million. All regressions include individual-level controls (years of schooling is dropped in sub-sample regressions), baseline city-level controls (log GDP and log of the tertiary sector's share in GDP), interactions between baseline city-level controls and a linear time trend, city fixed effects and year fixed effects. Standard errors clustered at the city level are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A8: Impact of the Hukou Reform on the Labour Market Outcomes of the Native Female (Education Heterogeneity)

	High Education Female			Low Education Female		
	(1)	(2)	(3)	(4)	(5)	(6)
	Job	Work hours	Log (Wage)	Job	Work hours	Log (Wage)
Treat (3-5 million) *Post	0.0129	0.1884	0.1931	0.0207*	1.0236***	0.0425
	(0.0109)	(0.5764)	(0.1637)	(0.0107)	(0.1889)	(0.0932)
Treat (1-3 million) *Post	0.0114	0.3276	0.0250	0.0486***	1.0244***	-0.0924
	(0.0116)	(0.5561)	(0.1221)	(0.0145)	(0.2419)	(0.0959)
Treat (0.5-1 million) *Post	0.0047	0.3759	-0.0655	0.0765***	1.5732***	0.0067
	(0.0191)	(0.7264)	(0.1806)	(0.0208)	(0.2798)	(0.0969)
Treat (<0.5 million) *Post	0.0272	0.3828	-0.1392	0.0826***	1.8417***	0.0117
	(0.0180)	(0.6779)	(0.1699)	(0.0229)	(0.3061)	(0.0992)
Individual-level controls	Yes	Yes	Yes	Yes	Yes	Yes
City-level controls(pre-policy)	Yes	Yes	Yes	Yes	Yes	Yes
City-level control*Time trend	Yes	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	3,529	3,297	2,907	10,535	8,359	7,068
R^2	0.1462	0.1109	0.2206	0.2367	0.1896	0.1978

*Note: This table reports estimates of equation (2) using the 2011, 2013, 2015, 2017 and 2019 waves of the China Household Finance Survey (CHFS). The sample is restricted to the native's female (Never changed Hukou) aged 16-65. Columns (1)-(3) use the high-education female sub-sample (college degree and above); columns (4)-(6) use the low-education female sub-sample (below college). The dependent variables are a dummy for having a job (columns 1 and 4), daily working hours (2 and 5), and the log of monthly labour wage after tax (3 and 6). "Treat (3-5 million) *Post", "Treat (1-3 million) *Post", "Treat (0.5-1 million) *Post", and "Treat (<0.5 million) *Post" are interaction terms between city-size treatment groups and the post-reform period; the omitted category is cities with population above 5 million. All regressions include individual-level controls (age, marital status, number of children, number of elderly household members), baseline city-level controls (log GDP and log of the tertiary sector's share in GDP), interactions between baseline city-level controls and a linear time trend, city fixed effects and year fixed effects. Standard errors clustered at the city level are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A9: Impact of the Hukou Reform on the Labour Market Outcomes of the Male native (Education Heterogeneity)

	High Education Male			Low Education Male		
	(1)	(2)	(3)	(4)	(5)	(6)
	Job	Work hours	Log (Wage)	Job	Work hours	Log (Wage)
Treat (3-5 million) *Post	-0.0049	0.7427**	0.1695	-0.0106	0.0002	0.0046
	(0.0080)	(0.3252)	(0.1139)	(0.0073)	(0.2420)	(0.0625)
Treat (1-3 million) *Post	0.0105	0.6669**	0.0803	0.0043	0.4705**	-0.0715
	(0.0095)	(0.2985)	(0.1140)	(0.0070)	(0.2183)	(0.0734)
Treat (0.5-1 million) *Post	0.0208*	1.2819***	-0.0344	0.0058	0.4023	0.0983
	(0.0119)	(0.4822)	(0.1346)	(0.0081)	(0.2720)	(0.0750)
Treat (<0.5 million) *Post	0.0106	1.6972***	0.0097	0.0007	0.6350**	0.2192**
	(0.0141)	(0.4653)	(0.1539)	(0.0086)	(0.3044)	(0.1009)
Individual-level controls	Yes	Yes	Yes	Yes	Yes	Yes
City-level controls(pre-policy)	Yes	Yes	Yes	Yes	Yes	Yes
City-level control*Time trend	Yes	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	4,309	3,852	3,531	15,645	12,348	11,386
R^2	0.0851	0.0853	0.2392	0.1107	0.0578	0.1509

NOTE. —This table reports estimates of equation (2) using the 2011, 2013, 2015, 2017 and 2019 waves of the China Household Finance Survey (CHFS). The sample is restricted to the native male (Never changed Hukou) aged 16-65. Columns (1)-(3) use the high-education male sub-sample (college degree and above); columns (4)-(6) use the low-education male sub-sample (below college). The dependent variables are a dummy for having a job (columns 1 and 4), daily working hours (2 and 5), and the log of monthly labour wage after tax (3 and 6). "Treat (3-5 million) *Post", "Treat (1-3 million) *Post", "Treat (0.5-1 million) *Post", and "Treat (<0.5 million) *Post" are interaction terms between city-size treatment groups and the post-reform period; the omitted category is cities with population above 5 million. All regressions include individual-level controls (age, marital status, number of children, number of elderly household members), baseline city-level controls (log GDP and log of the tertiary sector's share in GDP), interactions between baseline city-level controls and a linear time trend, city fixed effects and year fixed effects. Standard errors clustered at the city level are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A10: The List of the Cities

Above 5 million	3-5 million	1-3 million		0.5-1 million			Below 0.5 million		
Shanghai	Haerbin	Dongguan	Hangzhou	Linfen	Rizhao	Hengyang	Sanya	Xuancheng	Baiyin
Beijing	Dalian	Foshan	Liuzhou	Dandong	Qujing	Ganzhou	Sanming	Suzhou(Anhui)	Meishan
Nanjing	Taiyuan	Baoding	Zhuzhou	Jiujiang	Chaoyang	Chifeng	Shangrao	Bazhong	Suihua
Tianjin	Chengdu	Lanzhou	Shantou	Yichun	Benxi	Dazhou	Zhongwei	Pingliang	Jingmen
Guangzhou	Kunming	Baotou	Jinan	Jiamusi	Jiangmen	Lianyungang	Zhongshan	Guangyuan	Putian
Shenzhen	Wuhan	Nanning	Jining	Xinyang	Cangzhou	Suining	Lishui	Guangan	Huludao
Chongqing	Shenyang	Nanchang	Zibo	Neijing	Quanzhou	Xingtai	Lijiang	Yanan	Hengshui
	XIan	Nantong	Huainan	Nanchong	Taizhou	Shaoyang	Wulanchabu	Zhaotong	Quzhou
	Zhengzhou	Nanyang	Wenzhou	Taizhou	Luzhou	Chenzhou	Yunfu	Suzhou	Xuchang
	Changchun	Xiamen	Weifang	Xianyang	Haikou	Jinzhou	Haozhou	Laibin	Guigang
	Changsha	Hefei	Yantai	Shangqiu	Huaibei	Zhenjiang	Liuan	Songyuan	Hezhou
	Qingdao	Jilin	Yancheng	Siping	Xiangtan	Changzhi	Nanping	Meizhou	Ziyang
		Huhehaote	Shijiazhuang	Tianshui	Zhanjiang	Fuyang	Shuangyashan	Wuzhou	Yuncheng
		Tangshan	Fuzhou	Anqing	Binzhou	Shaoguan	Jian	Yulin	Jiuquan
		Datong	Zigong	Anyang	Chaozhou	Maanshan	Lvliang	Bijie	Jinhua
		Ningbo	Wuhu	Yibin	Yiyang	Hegang	Wuzhong	Yongzhou	Qinzhou
		Changzhou	Suzhou(Jiangsu)	Yichang	Panjin	Huangshi	Shangluo	Shanwei	Tieling
		Xuzhou	Xining	Yueyang	Qinhuangdao	Jingzhou	Jiayuguan	Hechi	Tongren
		Yangzhou	Guiyang	Changde	Shaoxing	Yingkou	Guyuan	Heyuan	Tongling
		Fushun	Handan	Zhangjiakou	Mianyang	Huizhou	Loudi	Haidong	Yangjiang
		Jieyang	Yinchuan	Deyang	Maoming	Fuzhou	Xiaogan	Weinan	Shuozhou
		Qiqihaer					Ningde	zhangzhou	Yaan
							Yichun	Baicheng	Zhumadian
							Longyan	Huangshan	Huanggang

NOTE. —This table reports the full list of sample cities by population tier used in the empirical analysis. City size is defined according to each city's 2014 urban area population. Cities with an urban population above 5 million form the control group (no relaxation of hukou admission), while cities with 3–5 million, 1–3 million, 0.5–1 million and below 0.5 million residents constitute Treatment Groups 1–4, respectively. These groupings are used to construct the multi-intensity treatment indicators in the difference-in-differences estimations.