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How Does Automation Risk Shape Social Policy Preference? Employment Insecurity and Policy Feedback Effect in China

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Workplace automation fueled by technological innovations has been generating social policy implications. Defying the prevalent argument that automation risk triggers employment insecurity and prompts individuals to favour redistribution, this study doesn't find empirical evidence in the Chinese context. Analysing national survey data, this study reveals a very strong association between automation risk and popular preference for government responsibility in old-age support. Further analysis suggests that more generous local welfare systems generate a reinforcing effect between automation risk and individuals' support for government involvement in old-age support. In a welfare system in which major redistributive policies are not employment-dependent, automation risk may not necessarily trigger stronger preferences for short-term immediate protection through redistributive programmes, but may stimulate individuals to project their need for social protection towards middle- or longer-term and employment-related policies. The generosity of subnational welfare systems moderates the formation of individuals' social policy preferences through policy feedback.

Keywords: Unemployment, welfare attitude, technology, automation, policy feedback.

Introduction

The impacts of technological innovations on social development have been the subject of extensive scholarly debate in recent years. While optimists believe that emerging technologies can accelerate breakthroughs in economic productivity and transform social service delivery (Autor *et al*., 2003; Manyika *et al*., 2017), others underline the downside of these innovations. One major concern points to the massive displacement (substitution) effects in the labour market. Because digitalisation and automation of work are likely to replace 'not only muscle but also brain power' (Bührer and Hagist, 2017: 115), significant unemployment has become a realistic social risk for many industries. The rapid development of artificial intelligence (AI) and machine learning (ML) is leading the way to a new era of automation, and routine-task-intensive occupations are likely to bear the brunt of job losses. Indeed, workplace automation has been a major disruptor of employment structures in many advanced economies (Goos *et al*., 2014; Sacchi *et al*., 2020). Various studies have substantiated this displacement effect by showing that workers in routine

occupations face a substantively higher threat of unemployment vis-à-vis their peers in non-routine occupations (Autor *et al*., 2003; Biagi and Sebastian, 2020).

These salient changes in the labour market and employment structure have left clear marks on the attitudinal dynamics of many societies. There is burgeoning research investigating how automation risk shapes individual attitudes towards social policy. In line with theoretical predictions, several recent studies have found that individuals in routine occupations were more likely to support social redistribution, given their greater exposure to unemployment risks (Thewissen and Rueda, 2019; Busemeyer and Sahm, 2021). Recent empirical research has found that automation-threatened workers demonstrated stronger support for active labour market policies (Im and Komp-Leukkunen, 2021) and minimum income schemes (Sacchi *et al*., 2020), but were unsupportive of social investment policies (Busemeyer and Sahm, 2021). Overall, employment insecurity triggered by workplace automation clearly alters the welfare preferences of (potentially) affected employees towards greater social protection, through a battery of self-interest mechanisms.

Notwithstanding the knowledge gained in recent years, there are two blind spots in the literature. First, the existing literature has predominantly focused on Western industrialised societies, leaving a dearth of knowledge regarding the East Asian context. This is not a trivial neglect of an empirical setting, nor would a study in East Asia only offer a mere addition of findings from a new context. East Asia is not only the largest human labour market, but countries in this region, especially China, Japan, and South Korea, are also giant players in the current wave of technological innovations. China, for example, has become one of the global leaders in automation installation (Oxford Economics, 2019). The sheer possible number of employees affected warrants scholarly as well as policy attention. Furthermore, comparative studies suggest that people in East Asia tend to hold more positive views towards the adoption of automated technologies than people in the West (Pew Research Center, 2017, 2020; Gnambs and Appel, 2019). Thus, it is intriguing to examine the attitudinal outcomes when the general positive view towards automation confronts the potential job market consequences.

Second, most previous studies have sought to explain the impact of automation risk on people's social policy preferences through individual-level attributes, but it has been increasingly recognised that the formation of welfare attitudes is not merely an individual-level phenomenon, but is also shaped by welfare context (Larsen, 2008; Jordan, 2010; Busemeyer and Sahm, 2021). This so-called 'policy feedback' effect creates an isomorphy between welfare institutions and social policy preferences (He *et al*., 2021). Therefore, any scholarly efforts aiming to reveal how technological innovations determine individuals' social policy preferences must pay due attention to the impact of structural characteristics of the welfare system. Described as 'residual' and 'developmental' in nature, the Chinese welfare system has been found to prioritise social investment over social consumption (Ratigan, 2017). As emerging automation technologies are introducing new employment risks, it is crucial to examine how employment insecurity affects people's welfare preferences through policy feedback in a system that provides *limited* social protection.

Analysing cross-sectional data derived from a nationally representative survey, this study examines the impact of automation risk on Chinese people's social policy preferences in two attitudinal dimensions: government responsibility in income redistribution and old-age support. Defying the prevalent argument that automation risk triggers employment insecurity, which in turn prompts individuals to favour redistributive policies,

this study doesn't find statistical support for this argument in the Chinese context. Instead, our empirical results reveal a very strong association between automation risk and popular preference for government responsibility in old-age support. Further cross-level interaction analysis suggests that more generous local welfare systems generate a reinforcing effect between automation risk and individuals' support for government involvement in taking care of the elderly.

These findings lead us to articulate two important arguments to enrich the theoretical discussion. First, in a welfare system in which major redistributive policies are not employment-dependent, the risk of workplace automation may not necessarily trigger stronger preferences for short-term immediate protection through redistributive programmes, but may stimulate individuals to project their need for social protection towards middle- or longer-term and employment-related policies. Second, the generosity of subnational welfare systems moderates the formation of individuals' social policy preferences through policy feedback. We tested two alternative feedback mechanisms – buffering effect and reinforcing effect – and established that the *reinforcing effect* underpins the feedback loop between macro social welfare institutions and individual attitudes. The practical implications of these findings are discussed towards the end of this article.

Automation, employment insecurity, and social policy preference

Labour automation is not a new phenomenon. Since the 1970s, automated technologies, particularly industrial robots, have been increasingly installed in manufacturing sectors and were designed to automate repetitive manual tasks. The recent technological advancements in AI and ML in the 'Fourth Industrial Revolution' further unleashed the capabilities of automated technologies (Frey and Osborne, 2017). These innovations along with advanced robotic engineering empower the automated technologies to not only take over the manual tasks but also increasingly replace a wide range of cognitive tasks, such as handwriting recognition, fraud detection, and medical diagnosis (Oxford Economics, 2019).

Moreover, breathtaking technological advances in AI and ML have reduced the unit cost of robotics, making wider use of automated technologies possible (Frey and Osborne, 2017). An increasing number of industries are accelerating the automation of their production. According to the World Robotics 2020 Industrial Robots Report, the number of industrial robots operating in factories totaled 2.7 million in 2019, registering an 85 per cent increase since 2014 (International Federation of Robotics, 2020). As the largest single-nation labour market, China is one of the global leaders in automation installation (Liu and Wang, 2019). The 'Made in China 2025' blueprint envisaged by the Chinese government has accelerated investment in automation. China has been the largest robot market worldwide since 2013 and continues to register rapid growth in this market (International Federation of Robotics, 2018).

Automated technologies combined with AI and ML are profoundly changing various aspects of socioeconomic activities in the long term, such as bolstering industrial productivity and creating new occupations. Nonetheless, they also inevitably bring out far-reaching labour market impacts, such as changing the nature of work, shifting the employment composition, and generating unemployment. Many studies have shown that employment shares for routine occupations consisting of repetitive and codifiable tasks have steadily declined (Autor *et al*., 2003; Biagi and Sebastian, 2020). As a result, people

in routine occupations are considered as the 'losers of automation'. Manyika *et al*. (2017) estimated that 60 per cent of the current occupations in forty-six major economies are automatable for at least 30 per cent of their constituent work activities. The widening relative difference in productivity between automation and manual labour is expected to lead profit-minded firms to substitute human labour with automated production. In China alone, it is predicted that the increasing use of industrial robots will lead to the lay-off of more than 11 million workers by 2030 (Oxford Economics, 2019).

Based on the self-interest thesis, the social policy literature has voluminously established that exposure to various economic risks such as unemployment stimulates people's demand for the expansion of social spending and public provision of welfare (Anderson and Pontusson, 2007; Rehm, 2009). Social protection is not only redistributive in nature, but '*also has an insurance aspect*' (Iversen and Soskice, 2001), insuring individuals against unemployment risks. The existing literature has widely found that individuals' social policy preference is a function of unemployment risk (Rehm, 2009; Alesina and Giuliano, 2011; He *et al*., 2022). Without doubt, employment insecurity triggered by job automation replacement represents a major risk for employees of affected occupations, who therefore expect greater non-market protection, especially social welfare. Following this, emerging studies posit that individuals' social policy preferences vary among occupations according to their degree of exposure to automation replacement. Those with higher automation replacement risks are expected to express stronger preference for social policies (Thewissen and Rueda, 2019; Sacchi *et al*., 2020; Busemeyer and Sahm, 2021; Im and Komp-Leukkunen, 2021). Needless to say, such social policy demands exert political pressure on governments in liberal democratic societies through organised trade union activities and, ultimately, electoral links. Even in political systems where such universal electoral links are largely absent, policy-makers may still be motivated to enact social policy provision in order to safeguard political legitimacy or mitigate social discontent (Ngok and Huang, 2014).

It is crucial to clarify that unemployment risk does not equate to actual job loss. In spite of their greater vulnerability to displacement, routine workers' elevated unemployment risk may not necessarily materialise into actual job loss. Thus far, only a fraction of routine workers worldwide has actually been laid off due to automation displacement (Kurer, 2020). Yet, many studies have elucidated that even *perceived* unemployment threat among routine workers still results in significant attitudinal reactions (Thewissen and Rueda, 2019; Sacchi *et al*., 2020; Busemeyer and Sahm, 2021; Im and Komp-Leukkunen, 2021).

National context

The past four decades have seen a phenomenal transformation of China's welfare system. Embedded into the communist planned economy, the old urban welfare system was built primarily on *danwei* (work units), especially the state-owned enterprises (SOEs) that supported a 'mini welfare system'. Commencing in the 1980s, China's transition towards a market economy vigorously unleashed the economic potential of the nation, but also swiftly dismantled its old welfare system (Leung and Nann, 1995). Lifetime employment, a hallmark of communist superiority, was no longer guaranteed, giving way to labour market liberalisation. Guided by the principle of 'development first, redistribution later',

China's welfare arrangements vividly represented the doctrine of East Asian 'welfare productivism' (Mok *et al*., 2017).

Major social policy reforms were accelerated from the early 2000s, guided by the professed goal of building a 'harmonious society' (Ngok and Huang, 2014). Contributory social insurance programmes in the areas of old-age pension, health care, unemployment, and work injury were instituted in urban formal sectors, with employers also playing a financing role. Empowered by its growing fiscal muscle, the government also gradually established similar social insurance programmes for employees in urban informal sectors as well as for rural residents, with substantial fiscal subsidies injected. In the meantime, the non-contributory *dibao* programme (Minimum Livelihood Guarantee Scheme) was also launched to serve as the country's social safety net (Guo *et al*., 2021).

A salient feature of the Chinese welfare system is its high level of fragmentation. Welfare entitlements are largely determined by local citizenship, urban/rural status, and occupation (Ringen and Ngok, 2017; Zhu and Walker, 2018). Because most welfare programmes are financed and administered at the local level, various factors especially the fiscal capacity of local governments have shaped 'welfare regionalism', leading to substantial variance in the level of financial protection across localities (Mok and Wu, 2013). For example, in terms of generosity, the per capita expenditure for urban social health insurance in Beijing is more than four times the outlay in Jiangxi Province (Huang, 2015). The social pension payment in Beijing is more than three times the standard in Qinghai Province (Zhu and Walker, 2018). It would be wrong, however, to assume that the gap is solely explained by the level of economic affluence, because Guo *et al*. (2021) have revealed an evident gap in terms of *dibao* standard even within provinces of similar socioeconomic status. Similar disparities also widely exist between occupations, with urban formal sector employees and civil servants enjoying more generous benefits (Ringen and Ngok, 2017; Zhu and Walker, 2018).

In fledged welfare states, robust unemployment protection programmes constitute a pivotal pillar of redistributive policies, providing a last-resort safety net for the laid-off (Clasen and Clegg, 2006). In contrast, the residualist welfare philosophy, compounded by informalisation of workforce, has not created an adequate unemployment protection system in many developing countries, including China (He *et al*., 2022). The unemployment insurance programme mainly covers people at low risk but leaves the high-risk population unprotected, resulting in a remarkable mismatch between risk profile and social protection. Exacerbating the situation is the stark contrast between the large sum of surplus accumulated and the low benefit rate of the unemployment insurance programme (Liu *et al*., 2016). Its income replacement rate (less than 20 per cent) is much lower than that of similar unemployment insurance programmes in other countries (Jiang *et al*., 2018). Given the shallow protection that the Chinese welfare system provides, especially unemployment protection, individuals threatened by employment insecurity tend to demonstrate a low expectation for redistributive policies (He *et al*., 2022).

Theories and hypotheses

It is widely known that social policies not only redistribute wealth, but also provide social insurance to individuals against a range of social risks, particularly old age, unemployment, and illness (Alesina and Giuliano, 2011). This 'insurance motive' stimulates people to support social policies to insure themselves against individual risks (Iversen and

Soskice, 2001). The received wisdom maintains that automation risk – an important risk for individuals in the labour market – creates demand for redistributive policies. Generous social transfer programmes such as unemployment insurance and minimal wages can compensate for the expected income loss and unemployment caused by automation replacement. However, this line of argument has yielded mixed results. By using cross-country data in Europe, some studies have found that individuals in occupations at greater risk of workplace automation show significantly higher levels of support for redistributive policies in order to compensate for expected income loss due to unemployment (Rehm, 2009; Thewissen and Rueda, 2019). Other studies, however, haven't found a significant relationship. Dermont and Weisstanner (2020) contended that redistributive preference in the early stream of studies was essentially taken as a shorthand to capture both the redistributive and insurance functions of social policies; lumping both dimensions into one composite measure may have masked the considerable attitudinal heterogeneity across distinctive social policy domains. Ultimately, individuals' preferences for redistribution depend on their cost-benefit calculations regarding redistributive programmes.

It is the central contention of this study that automation risk may not necessarily strengthen individuals' redistributive preference in China. Gingrich and Ansell (2012) illuminated that individuals' labour market risk matters for their social policy preferences only when welfare benefits are employment-dependent. In other words, for welfare programmes in which entitlement is not tied to employment, being paid off or not may not engender discernable attitudinal cleavages in terms of popular support. As a result, one's labour market risk may exert no influence on his/her preference for employment-independent welfare benefits, simply because 'it's not within my reach' or 'I'm entitled to it anyway' (He *et al*., 2022).

Various studies have reported wide agreement among Chinese people that the government should assume more responsibility in redistribution (Huang, 2019; Dalen, 2021). Yet, the benefits of redistributive programmes in China are either linked to the provision of general social services to all citizens, such as basic education, or are employment-independent. For example, the generous fiscal subsidies offered to urban-rural resident social insurance programmes and various cash transfer programmes are not tied to one's employment status. As such, where redistribution benefits are offered to people as citizens, rather than in the capacity of employees, higher risks of unemployment due to automation do not necessarily trigger stronger demand for redistribution. Put simply, workplace automation or not, eligible individuals are still entitled to benefits from redistributive policies. The above logic leads us to posit:

H_1: Ceteris paribus, individuals threatened more by automation replacement are not necessarily more supportive of redistributive policies.

The existing literature maintains that major exogenous shocks or threats induce individuals to favour immediate, short-term compensation at the expense of gradual, long-term social protection (Anderson and Pontusson, 2007; Häusermann *et al*., 2015; Han and Kwon, 2020). But as we have explained above, the weak unemployment protection system in China by no means offers a reliable social safety net for laid-off individuals (Jiang *et al*., 2018; He *et al*., 2022). Therefore, we speculate that when short-term protection is shallow or unreliable, rational individuals may project their needs for social protection towards middle- or longer-term benefits.

Old-age support is one such example. Government and families have been two key sources of old-age support in the Chinese society. The former instituted a contributory old-age pension system that is basic in benefits but employment-dependent, while the latter operates on the basis of filial piety. However, unemployment due to automation replacement would not only lead to a significant reduction (and even loss) of pension benefits, but also result in a big loss of household income, which in turn weakens families' ability in providing old-age support. Thus, automation displacement may shake both foundations, aggravating individuals' anxiety about old-age support and increasing their expectation for government responsibility in this regard. Such anxiety has been exacerbated by concerns regarding the financial sustainability of China's pension system, and the weakening of family support due to changes in family structure and social norms (Feng *et al*., 2012; Yang and Chen, 2019). In consequence, as far as Chinese urban workers are concerned, the adverse impacts triggered by unemployment are prolonged and highly consequential, making old-age support an even bigger individual risk (He, 2022). Given the contextual dynamics explained above, it is reasonable to hypothesise:

H_2: Ceteris paribus, individuals threatened more by automation replacement are more likely to expect stronger government responsibility in old-age support.

If H_2 holds true, we expect its impact to be contingent upon macro welfare system context. A growing stream of the social policy literature highlights the importance of policy feedback effects through which pre-existing social policies and welfare programmes shape citizens' policy preferences and behaviors (Larsen, 2008; Jordan, 2010). He *et al*. (2021) recently discovered that the subnational variation in China's social health insurance programmes in both coverage and generosity had indeed produced varying attitudinal feedback patterns at the local level. What individuals want from the government ultimately depends on how existing social policies shape their experience of individual risk (Gingrich and Ansell, 2012). Hence, this study seeks to go beyond the conventional argument that automation risk affects social policy preferences through individual's likelihood of workplace displacement, by bringing macro institutional factors into the equation. Given the highly fragmented social welfare system in China, it is reasonable to expect that individuals living in different local welfare systems would demonstrate salient differences in how they perceive government responsibility in mitigating automation risk. Inspired by the policy feedback literature, we propose two competing hypotheses with regard to the moderating effect of welfare systems: *buffering effect* and *reinforcing effect*.

Generous welfare arrangements can provide stronger social safety nets against labour market shocks, and therefore, individuals in these welfare systems are expected to be less sensitive to labour market risks because welfare programmes act as a robust buffer against potential job and income loss. Thewissen and Rueda's pioneering work revealed salient attitudinal feedback effects in that a more generous welfare state generates a buffering effect on the negative impact of technological change. A more developed welfare state reduces the demand for a further expansion of social policy (Thewissen and Rueda, 2019; Busemeyer and Sahm, 2021). Following this theoretical logic, we speculate that when automation risk hits, generous local welfare systems in China should be able to better cushion the labour market shock and individuals should show less demand for old-age support. Thus, we put forth the following hypothesis:

H_{3a} (buffering effect): Provincial welfare provision negatively moderates the triggering effect of automation risk on expectation of government involvement in old-age support. That is, the positive impact of automation risk on expectations for government involvement in old-age support gets attenuated as the generosity of welfare provision increases.

Contrary to the notion of the buffering effect, another stream of the policy feedback literature posits that social policies and public opinion usually form a reciprocal relationship. It is argued that generous welfare systems can create material incentives and normative expectations that further reinforce social policy support because they construct new constituencies of beneficiaries that are organised to defend the material benefits provided to them by existing policies (Pierson, 1994; Campbell, 2012). Many studies in both China and Western welfare states have found that generous welfare systems are indeed usually associated with larger populations in support of strong government responsibility in welfare provision (Im and Meng, 2016; Huang, 2019; Dalen, 2021). Such a reinforcing effect may be at play in China as people in generous local welfare systems are likely to appreciate the social protection provided to cushion the adverse impact of workplace automation and thus expect additional welfare provision. We hence put forth the following hypothesis:

H_{3b} (reinforcing effect): Provincial welfare provision positively moderates the triggering effect of automation risk on expectation of government involvement in old-age support. That is, the positive effect of automation risk on expectation of government involvement in old-age support gets strengthened as the generosity of welfare provision increases.

Data and variables

Data

The data used in this study came from the China General Social Survey (CGSS), one of the largest survey projects in China (http://cgss.ruc.edu.cn). First launched in 2003, the CGSS was subsequently conducted in 2004, 2005, 2006, 2010, 2012, 2013, 2015, and 2017. This dataset contains questions regarding Chinese individuals' opinions in multiple domains, such as sociopolitical issues, welfare policies, environmental issues, and so forth. CGSS-2017 employed a stratified multi-stage sampling design, covering all provincial divisions in mainland China. Primary sampling was performed on counties and sub-city districts, which was followed by a secondary sampling on rural villages and urban neighborhood communities. Households were then randomly drawn in the third phase. The response rate was 87.9 per cent.

We used the CGSS-2017 in the present study for two reasons. First, this wave of the survey provided an occupation code that enabled us to identify every respondent's routine-task intensity (RTI) index, which is commonly used to capture the relative importance of routine work in the task structure of an occupation (Thewissen and Rueda, 2019). Second, the 2017 wave included a useful module to measure respondents' welfare attitudes. We restricted our analytical attention to the sub-sample of employed individuals given the research focus of the current study. The working dataset therefore shrank to a sample of 1,443 observations. We present detailed information about this dataset in the Appendix A.

Dependent variables

Our empirical analysis examined the effect of one's RTI index in his/her support for income redistribution and old-age support. Named 'redistributive preference', the first dependent variable captured one's attitudes towards government responsibility in redistribution. Following the measurement strategy of similar studies (Alesina and Giuliano, 2011; Huang, 2019), we employed the following survey item to gauge one's redistributive preference: 'To what extent do you agree with the statement that it's the government's responsibility to reduce the income gap between high-income earners and low-income earners?' Respondents were invited to indicate their level of endorsement on a five-value descending scale where 1 represented 'strongly agree' and 5 represented 'strongly disagree'. We dichotomised this variable by grouping the first two answer categories to represent redistributive preference and coded it as 1.

Labeled as 'old-age support', the second dependent variable measured one's expectation of government responsibility in taking care of the elderly. The CGSS-2017 asked respondents 'In your opinion, who should take care of the elderly in our country?' Respondents were invited to choose from 'the government', 'private enterprises', 'non-government organisations/charity', 'religious organisations', and 'family, relatives or friends'. Responses indicating 'the government' were coded as 1 and otherwise as 0.

Independent variable

RTI, the independent variable of the study, represents the automation risk of an occupation. Following the approach of Thewissen and Rueda (2019), we used the RTI index developed by Goos *et al*. (2014) to measure the degree of an individual's job exposure to automation replacement. Capturing the task structure of an occupation, the index distinguishes three main types of job tasks – routine, manual, and abstract – involved in a given occupation. Each main task's measure is based on several task variables derived from the Dictionary of Occupational Titles. With a mean of 0 and a standard deviation of 1, this index captures the relative importance of routine tasks versus manual and abstract tasks in an occupation. A higher value suggests that the occupation involves a higher proportion of routine tasks and is consequently more vulnerable to automation replacement (Goos *et al*., 2014).

Moderating variables

The moderation analysis required for testing H_{3a} and H_{3b} was intended to examine how the generosity of local welfare systems shapes individuals' social policy preference. Here, we explicitly focused on provinces because the old-age pension scheme, China's largest social insurance programme, is administered at the provincial level. The risk pooling of the unemployment insurance schemes is expected to be elevated from prefectures to provinces soon. Hence, taking provinces as a unit of analysis allows us to gauge the subnational variance in welfare generosity, which was represented by the level of unemployment insurance benefit and old-age pension. The former was measured by per capita unemployment insurance spending (UIS) and the latter was measured by per capita old-age pension payment (OPP) of a province in 2017. Data were collected from

local official statistical yearbooks. We took the natural logarithm of the two variables in statistical analysis in order to make the coefficients directly interpretable.

We also controlled for a range of individual- and provincial-level factors that are expected to affect social policy preference by existing studies. The detailed descriptions of control variables are reported in Appendix C.

Regression results

Because our dependent variables were binary, we employed logit models to perform regression analysis. Considering that respondents nested within the same province may have shared some common characteristics, we clustered standard errors at the provincial level. Following the statistical strategies of Thewissen and Rueda (2019), we regressed our dependent variables in a stepwise fashion. Model 1 included only RTI, our key independent variable, while a range of individual- and provincial-level controls were included in Model 2. Model 3 and Model 4 further added two moderating variables that captured the generosity of local welfare provision. This stepwise statistical strategy allowed us to examine the effect of key explanatory variables individually and in combination and to assess the explanatory robustness of these variables. Because UIS and OPP were moderately correlated, we added them separately in regression models in order to avoid potential complications resulting from multicollinearity.

Table 1 presents the estimation of the relationship between RTI and individuals' redistributive preference. As expected, RTI score did not explain redistributive preference in a statistically significant manner across all models. H_1 was therefore endorsed. The generosity of neither old-age pension nor unemployment benefit predicted the dependent variable. Unsurprisingly, holding egalitarian views strongly predicted redistributive preference. Three control variables were related to the dependent variable; being older, being unmarried, and holding urban *hukou* led a person to support stronger government responsibility in redistribution.

In Table 2, we analysed the relationship between RTI and individuals' expectation for government responsibility in old-age support. RTI score significantly predicted the dependent variable, indicating that those in routine occupations held stronger preferences for social protection in the form of old-age support. Thus, H_2 was supported. Moving to the effect of provincial structural factors, we noted a strong negative statistical association between generosity of unemployment benefit and one's expectation of government responsibility in old-age support. Generosity of old-age pension registered a similar effect on the dependent variable. It should be noted that urban *hukou* status was positively associated with both dependent variables, similar to the findings of previous studies (Huang, 2019; He *et al.*, 2021). This association is likely to rest on the policy feedback effect. As urban *hukou* holders are generally entitled to more generous welfare benefits, such experiences reinforce their beliefs that the government should continue to be responsible for welfare provision (He *et al.*, 2022).

Table 3 estimates cross-level interactions. Model 1 and Model 2 included the interaction term between RTI and the level of unemployment benefits. Model 3 and 4 added the interaction term between RTI and the level of old-age pension in a province. The interaction terms turned out to be significantly positive across all models, suggesting that the generosity of provincial welfare provision robustly reinforced the stimulating effect of RTI on expectation of government involvement in old-age support. In other

Table 1 Logistic regression results: support for government redistribution

	Model 1 RTI only	Model 2 + controls	Model 3 + UIS	Model 4 +OPP
RTI	0.056	0.043	0.043	0.043
	(0.074)	(0.071)	(0.071)	(0.070)
ln(UIS)			0.012	
			(0.129)	
ln(OPP)				−0.123
				(0.254)
Male		−0.071	−0.071	−0.071
		(0.110)	(0.110)	(0.109)
Age		0.019***	0.019***	0.019***
		(0.005)	(0.005)	(0.005)
Education		0.025	0.025	0.025
		(0.019)	(0.019)	(0.019)
Married		−0.320**	−0.319**	−0.322**
		(0.136)	(0.136)	(0.136)
Party member		0.244	0.243	0.249
		(0.167)	(0.165)	(0.168)
Health status		0.184	0.184	0.181
		(0.230)	(0.229)	(0.231)
Co-residing		−0.052	−0.051	−0.056
		(0.146)	(0.143)	(0.145)
Lower income		0.230	0.230	0.233
		(0.145)	(0.145)	(0.145)
SOEs		0.230	0.230	0.228
		(0.188)	(0.188)	(0.188)
Urban *Hukou*		0.246*	0.247*	0.245*
		(0.147)	(0.144)	(0.146)
Egalitarian value		1.495***	1.496***	1.497***
		(0.119)	(0.119)	(0.117)
ln(GDP)		0.039	0.035	0.076
		(0.212)	(0.207)	(0.202)
Public service		−0.000	0.001	−0.015
		(0.054)	(0.059)	(0.066)
Constant	0.980***	−1.580	−1.627	−0.831
	(0.078)	(2.548)	(2.681)	(3.310)
Log likelihood	−840.64	−735.90	−735.90	−735.72
N	1431	1389	1389	1389
Number of provinces	27	27	27	27

Note. Robustness standard errors clustered at the provincial level are reported in parentheses; ***p<0.01, **p<0.05, *p<0.1.

words, when facing automation risks, individuals in provinces with generous welfare provision were more likely to expect the government to shoulder the main responsibility in supporting the elderly.

Table 2 Logistic regression results: support for government responsibility in old-age support

	Model 5 RTI only	Model 6 + controls	Model 7 + UIS	Model 8 +OPP
RTI	0.146***	0.122**	0.125**	0.126**
	(0.054)	(0.059)	(0.058)	(0.058)
ln(UIS)			−0.443**	
			(0.209)	
ln(OPP)				−0.530*
				(0.312)
Male		−0.481***	−0.483***	−0.480***
		(0.153)	(0.155)	(0.155)
Age		0.018***	0.018***	0.019***
		(0.005)	(0.005)	(0.005)
Education		0.049*	0.049**	0.047*
		(0.026)	(0.025)	(0.025)
Married		0.066	0.057	0.061
		(0.205)	(0.204)	(0.216)
Party member		0.162	0.162	0.139
		(0.226)	(0.228)	(0.230)
Health status		−0.172	−0.157	−0.146
		(0.268)	(0.280)	(0.276)
Co-residing		−0.289**	−0.283**	−0.266**
		(0.126)	(0.120)	(0.128)
Lower income		0.333**	0.349**	0.334**
		(0.153)	(0.156)	(0.156)
SOEs		0.082	0.069	0.069
		(0.168)	(0.176)	(0.173)
Urban *Hukou*		0.577***	0.608***	0.609***
		(0.181)	(0.179)	(0.180)
Egalitarian value		0.215	0.223*	0.211
		(0.134)	(0.134)	(0.133)
ln(GDP)		0.580***	0.566***	0.419***
		(0.160)	(0.168)	(0.160)
Public service		−0.114**	−0.127***	−0.055
		(0.044)	(0.049)	(0.050)
Constant		−6.612***	−5.138***	−3.139
		(2.079)	(1.980)	(2.457)
Log likelihood	−839.65	−757.77	−753.78	−754.13
N	1417	1372	1372	1372
Number of provinces	27	27	27	27

Note. Robustness standard errors clustered at the provincial level are reported in parentheses; ***p<0.01, **p<0.05, *p<0.1.

Table 3 Logistic models: interactions on old-age support

	Model 9 RTI×ln(UIS)	Model 10 +controls	Model 11 RTI×ln(OPP)	Model 12 +controls
RTI	−1.154*	−1.039*	−1.642*	−1.550*
	(0.611)	(0.573)	(0.968)	(0.929)
ln(UIS)	0.189	−0.424**		
	(0.244)	(0.205)		
RTI×ln(UIS)	0.209**	0.187**		
	(0.095)	(0.089)		
ln(OPP)			0.346	−0.509*
			(0.313)	(0.307)
RTI×ln(OPP)			0.208*	0.196*
			(0.113)	(0.108)
Male		−0.478***		−0.484***
		(0.153)		(0.156)
Age		0.018***		0.019***
		(0.005)		(0.005)
Education		0.049*		0.049**
		(0.026)		(0.025)
Married		0.063		0.064
		(0.203)		(0.203)
Party member		0.169		0.154
		(0.225)		(0.227)
Health status		−0.160		−0.154
		(0.272)		(0.280)
Co-residing		−0.287**		−0.278**
		(0.126)		(0.121)
Lower income		0.343**		0.350**
		(0.154)		(0.156)
SOEs		0.101		0.086
		(0.163)		(0.171)
Urban *Hukou*		0.566***		0.600***
		(0.181)		(0.178)
Egalitarian value		0.197		0.212
		(0.133)		(0.133)
ln(GDP)		0.577***		0.561***
		(0.157)		(0.164)
Public service		−0.117***		−0.131***
		(0.043)		(0.049)
Constant	−2.092	−5.188***	−3.879	−3.251
	(1.533)	(1.946)	(2.715)	(2.450)
Log likelihood	−836.81	−752.36	−835.48	−752.96
N	1417	1372	1417	1372
Number of provinces	27	27	27	27

Note. Robustness standard errors clustered at the provincial level are reported in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

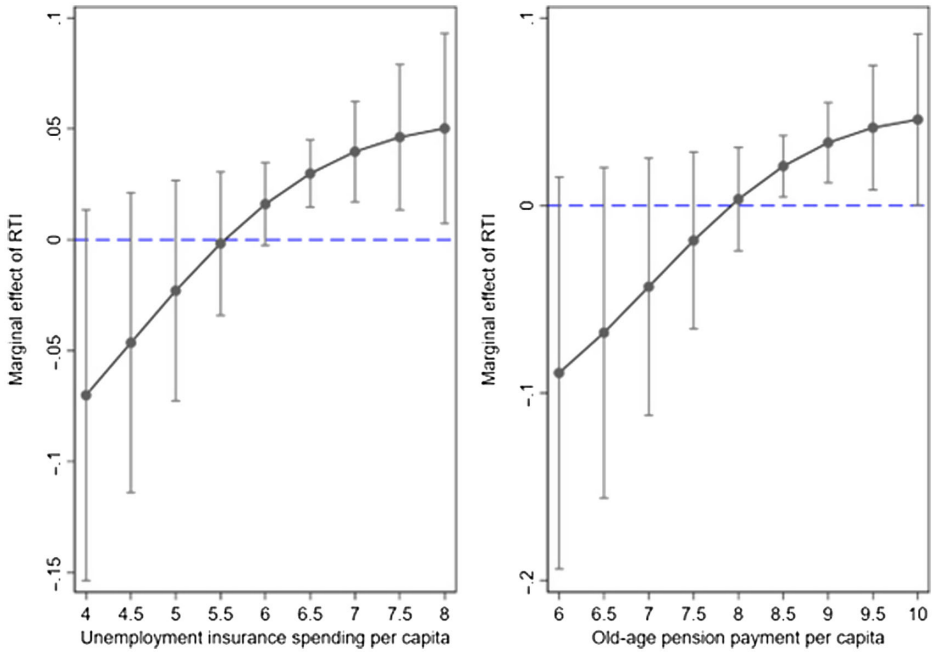

Figure 1. Marginal effects of RTI on old-age support.

Figure 1 further illustrates the estimated effects of the interaction terms. We observed that the average marginal effect of RTI on the dependent variable increased as the level of provincial welfare generosity increased. Specifically, when the value of unemployment benefit in log form was above 6, the marginal effect of RTI became statistically significant between 2 per cent and 6 per cent. The statistical significance was lost when the log-form value fell below 6. Similarly, the marginal effect of RTI was statistically significant between 3 per cent and 5 per cent when the value of old-age pension (in log form) was above 8. When the value fell below 8, the marginal effect of RTI became negative and insignificant. These results combine to confirm that the generosity of provincial welfare systems positively moderated the stimulating effect of RTI on the preference for government involvement in old-age support. For example, office clerks tend to exhibit higher expectation of governments' responsibility in old-age support than professionals. This attitudinal gap between clerks and professionals widens in provinces that offer generous welfare provision. In sum, the results presented in Table 3 and Figure 1 led us to endorse the reinforcing effect hypothesis (H_{3b}) and reject the buffering effect hypothesis (H_{3a}). The main empirical results were corroborated by several robustness checks that are exhibited in the appendix due to page limit.

Discussion and conclusion

This study has analysed how the flourishing automation technologies affect individuals' social policy preferences in China. We posit that in a middle-income country characterised by developmental welfare mentality and modest social protection, individuals

threatened by workplace automation may demonstrate different welfare attitudes vis-à-vis their peers in Western welfare states. Engaging with recent scholarly arguments, four research hypotheses were formulated. We considered individual-level unemployment risk and institutional-level factors, with the assumption that individual-level association between automation risk and social policy preference is mediated by welfare system contexts. The empirical results show that automation risk is not significantly associated with an individual's redistributive preference but may trigger expectation for greater government responsibility in old-age support. Further moderation analysis suggests that generous local welfare provision reinforced this stimulating effect via the policy feedback loop. These findings reflect people's escalating anxiety about the reliability of China's old-age support system, which turns out to be a major pressing welfare concern for Chinese employees threatened by workplace automation.

This study leads to several important insights. First, contrary to the conventional wisdom that people in East Asia are less concerned about the adverse effects of technological revolutions and are more positive about robot installation, our study suggests that threats of workplace automation indeed trigger major attitudinal reactions in China, boosting employees' expectation for government welfare responsibility. When the current wave of technological revolution hit the West, fairly mature welfare states already provided a relatively robust social safety net to cushion labour market shocks. In contrast, the welfare systems of many developing countries still fall short in terms of depth of social protection in general and labour protection in particular, leaving automation-threatened employees even more vulnerable to labour market risks.

Second, while automation risk indeed amplified Chinese employees' social policy preferences, we did not observe any significant association between the risk and one's preference for redistribution, as noted in many Western societies. Instead, the triggering effect turned out to be most salient in the old-age arena. We explain this discrepancy by categorising welfare programmes into employment-dependent and employment-independent ones, and argue that when major redistributive programmes are employment-independent, automation-threatened employees tend to project their social policy preferences towards employment-dependent ones. This argument helps reconcile the mixed results regarding the impacts of automation risk on welfare attitudes. We move this stream of the scholarly debate forward by explicitly highlighting the attitudinal heterogeneity across different welfare domains. The way in which automation replacement risk triggers popular support for old-age support in China enriches scholarly understanding on the complex interaction between technological innovation, demographic change, robustness of social protection system, and welfare attitudes.

Third, building on insights from the thriving policy feedback literature, this study has detected notable attitudinal feedback effects. The association between automation risk and individuals' expectations for government responsibility was moderated by the strength of local welfare provision. In other words, subnational welfare institutions, as represented by the generosity of old-age pensions and unemployment benefits, participate in the formation of individuals' welfare attitudes in China, as far as the implications of workplace automation are concerned. However, the policy feedback mechanism emerging from this study points to a clear reinforcing effect, instead of a buffering effect as found in prior studies based in the West. Specifically, generous welfare provision at the provincial level increased automation-threatened workers' expectations for government responsibility in old-age support. We argue that in a residual system with modest welfare

provision, social policy often serves to not only meet people's welfare needs, but also powerfully unleash more of these needs, hence forging a reinforcing loop (Dalen, 2021). We posit that the occurrence of a buffering effect is conditional on a relatively robust welfare system, whereas a reinforcing effect is likely to characterise policy feedback mechanisms in developing countries before such systems are in place.

This study wishes to offer a takeaway point. Written in 2021 and 2022, the article certainly cannot shy away from discussing the research implications against the COVID-19 backdrop, although its research setting was the pre-pandemic years. Vast job loss in virtually all countries between 2020 and 2022 not only reflected the tremendous destructive power of the pandemic, but also exposed deeply entrenched social inequalities. Recent research has called for revisiting social policy designs that shape future patterns of social inequality (Béland *et al*., 2022; Capano *et al*., 2022). It is unclear to what extent and at what pace workplace automation will resume momentum in the post-COVID era, but this study underscores the necessity for greater social protection for this emerging group of vulnerable people, especially when old social risks such as unemployment are being compounded by the new 'COVID social risks'. The need is particularly strong in countries which have 'aged' but yet built up a robust social protection system, such as China and South Korea (Choi *et al*., 2022; He *et al*., 2022). If workplace automation and other technological innovations do get accelerated, governments in this region should seek to institutionalise new social policy settlement that is able to help affected social groups absorb these old and new labour market shocks. The policy planning and strengthening of old-age support systems should give due recognition to these groups.

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Supplementary material

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