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Geographic politics, loss aversion and trade policy: The case of cotton in China

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Abstract

This paper seeks to explain how China's trade policy responses to world price fluctuations by considering the role of loss aversion and reference dependence. In order to analyse the effect of loss aversion on trade distortion in one-party dominated countries where monetary contribution may not be feasible, we modify the model of Freund and Özden (*American Economic Review*, 2008, 98, 1675) to obtain a model in which loss aversion no longer works through monetary contribution but through political supports from politically sensitive groups. We then test the theoretical predictions by using data from China's cotton sector. The modified theoretical model predicts that loss aversion and reference dependence still have effects on the trade distortion in countries where monetary contribution may not be feasible and that the trade distortions are higher (lower) when the world price is lower (higher) than the targeted domestic reference price, which measures reference dependence. Our empirical evidence from China's cotton sector supports these theoretical predictions.

KEYWORDS

loss aversion, politically sensitive products, trade distortion

1 | INTRODUCTION

What drives the government's response to the world agricultural price fluctuations attracts lots of attentions (Anderson & Nelgen, 2013; Fulton & Reynolds, 2015; Giordani et al., 2016; Thennakoon, 2015; Yan & Deng, 2019). Few papers consider the role of behaviour characteristics, such as loss aversion and reference dependence, on the short-term changes of the government's agricultural trade policy. Freund and Özden (2008) provide the first theoretical model that incorporates loss aversion and reference dependence to explain government's trade protection towards declining industries, which is not consistent with standard political economy models that predict trade protection should be applied to expanding sectors. The basic idea of Freund and Özden's model is that loss aversion of the declining industries incentives group lobby and monetary contribution, which leads to more protections of the declining sectors.

The current article investigates if loss aversion and reference dependence can also explain the trade protection in a one-party dominated country such as China. The answer to this question is not straightforward because, according to the political contributions model of Freund and Özden (2008), loss aversion works through group lobby and monetary contribution. But in one-party dominated countries, group lobby and monetary contribution may not as efficient as that in more democratic countries. However, similar to the argument of Freund and Özden (2008), interest groups in one-party dominated countries could still transform their loss aversion into more trade protection through other channels, such as creating social unrest and sending petitions to the central government.

For this reason, we modified the model of Freund and Özden (2008) to obtain a model where loss aversion no longer works through group lobby and monetary contribution. Instead, we assume the government's objective function as the sum of the political support from the politically sensitive groups and the aggregate social welfare, so politically sensitive groups can express their loss aversion through their political supports. Our model predicts that the producer of politically sensitive products will receive more trade protection when experiencing losses because the government cares more about their loss aversion. Similar to the finding of Freund and Özden (2008), the modified model also predicts an important role of *reference dependence* under the condition of loss aversion. We find that the trade distortions are higher (lower) when the world price is lower (higher) than the targeted domestic reference price, which measures reference dependence. These predictions are shown to still hold when the model is extended to a large country case involving terms of trade effects because the loss aversion effect is independent of the terms of trade effect.

We then empirically test the predictions of our model by using data from China's cotton sector. The cotton sector in China provides an ideal experiment to analyse trade policy formations under loss aversion and reference dependence for countries without efficient monetary contribution. This is because cotton is a politically sensitive product in China. More than a quarter of the world cotton is produced in China, while more than 60% of China's cotton is produced in its Xinjiang province. The geographic location and the large share of Muslims in Xinjiang make it a politically sensitive region. Xinjiang borders eight countries and with 60% of its total population being Uyghur. The minorities are more likely to organise political groups to fight against local or central governments. Therefore, the Chinese government is more likely to adopt trade distortions to protect cotton planters due to the important role of cotton in employment and income in Xinjiang.

Evidence from China's cotton sector supports our model predictions. By comparing the trade protection of the politically sensitive cotton with that of less politically sensitive agricultural products (e.g., rice and wheat), we find that cotton received much more protections. In addition, our empirical analysis also identifies statistically significant effects of loss aversion and reference dependence on the trade protection of cotton in China. These findings are robust to various control variables and estimation methods.

The current article contributes to the literature by extending the model of Freund and Özden (2008) to a model that is suitable for one-party dominated countries where loss aversion no longer works through monetary contribution but through political support from the politically sensitive groups. In addition, we provide stronger empirical evidence supporting the predicted effects of loss aversion and reference dependence on the trade distortion. Notice that Freund and Özden (2008) mainly support their theoretical predictions by simple summary statistics of the data from the US steel industry, but the current article provides various econometric analyses by using data from China's cotton sector.

This paper is first related to how behaviour characteristics affect the formation of trade policy. The G-H model hypothesises that an individual's utility only depends on his or her consumption bundle, which meant it could not explain behavioural elements associated with the political economy dynamics behind trade protection (Dissanayake, 2014). Agents' preferences towards loss aversion and reference dependence are now being built into political contribution models (Freund & Özden, 2008; Tovar, 2009). Loss aversion refers to people's tendency to feel stronger about avoiding losses than acquiring gains, and losses reflect particular reference points. Freund and Özden (2008) explain why trade protection is given when the world price falls below a given reference price. Tovar (2009) incorporates individual preferences exhibiting loss aversion into the political objective function.

During recent years, loss aversion has been built into analyses of government responses to market shocks. Anderson and Nelgen (2012) set up loss aversion in quadratic rather than linear form, which is consistent with the conservative social welfare function in Corden (1997). They show that during price upward spike periods, developing countries alter their agricultural trade policies more than high-income countries, and vice versa during downward agricultural price shocks. Giordani et al. (2016) analyse the multiplier effect of food-exporting countries seeking to insulate the domestic market from the world market. Dissanayake (2014) presents a general equilibrium model that projects changes in trade restrictions irrespective of the lobbying behaviours of interested groups who make monetary contributions to the democratic government. Thennakoon (2015) follows Baldwin (1987) with a partial equilibrium model in which the government objective function is the weighted summation of consumer surplus, producer surplus and tariff revenue, and uses loss aversion as in Freund and Özden (2008) and Tovar (2009) to analyse government responses to downward spikes in world prices. Loss aversion is also used by Fulton and Reynolds (2015) in considering the rice export system in a non-democratic country, Vietnam. They conclude that in such a setting, the elite could increase their political and economic power from restricting exports. The government's objective function is set with behaviour features including reference dependence and loss aversion not only from a producers' perspective but also from that of consumers. We find that our theoretical model can partly explain China's cotton policy.

Broadly, this paper is related to the political economy of trade policy. The perspective of the political economy provides a framework for politicians and economists to uncover the formation and variations over time in policy interventions. Various branches of thought, dating back to the 1960s, have given insight into the interactions of economic and political forces among different interest groups affecting the policy equilibrium. Among the important contributions, Olson (1965) pioneered the role of collective actions to overcome the free-rider problem to influence policy outcomes of government. Numerous other traditional political models, including regulation theory (Stigler, 1971), pressure group theory (Becker, 1983; 1985), policy preference functions (Rausser & Freebairn, 1974), political support functions (Hillman, 1982), political preference functions (Bullock, 1994) and the conservative social welfare function (Corden, 1997) seek to explain the reasons why governments implement inefficient distorted policies in different sectors. In the case of agricultural policies, the arable land endowment per worker, the employment share in the agricultural sector, terms of trade for agriculture, the share of agriculture in GNP and the share of food in total expenditure are discussed based on collective action by different interest groups (Anderson & Hayami, 1986; Rausser, 1982). Other factors including low farm incomes, slow farm productivity growth, and low supply and demand elasticities are also emphasised (Gardner, 1987).

Grossman and Helpman (1994) improved the interest group model by providing microeconomic foundations, such that it became the workhorse tool to explain trade policy formation. Based on the G-H model, a preference for inequality aversion is introduced into the individual's utility function (Lü et al., 2012). This comparative static model was followed by a dynamic political economy model with overlapping generations, heterogeneous agents, endogenous human capital investment and costly worker adjustment (Blanchard & Willmann, 2013), and used to analyse the protectionist overshooting phenomenon. Specifically, when politically influenced workers are 'stuck' in adversely affected import-competing sectors, they are more likely to get short-term policy remediation in the form of higher tariffs. The more unequal the initial distribution of gains and losses from the magnitude of potential overshooting will be, the longer the induced policy distortion will persist.

In parallel with the political contribution model, the tariff-formation-function model (Findlay & Wellisz, 1982), campaign-contribution model (Magee et al., 1989), political support model (Rodrik, 1995) and median-voter model (Mayer, 1984) were developed and adopted to analyse agricultural policy formation. Other contributions to policymaking that have been emphasised more recently are institutions (Acemoglu & Robinson, , 2012), limited access orders (North et al., 2009), the role of constitutions (Persson & Tabellini, 2000) and electoral institutions (Besley & Persson, 2011). In this paper, we document the effects of sensitive political groups on the government's trade policy formation process in a one-party country characterised by geographic dimensions of interest group politics.

The structure of this paper is as follows. Section 2 develops the theoretical model and extends it from a small country to a large country. Section 3 provides background information on China's cotton production, Xinjiang's geographic position and cotton trade policies. China's cotton trade policy is used to empirically test the model in Section 4, and Section 5 concludes.

2 | THEORETICAL FRAMEWORK

2.1 | The model

Consider a small open economy populated by individuals with identical preferences. Individuals own different types of specific factors and labour endowments. All the agents have the following consumption preference characterised by loss aversion and reference dependence:

$$U = x_0 + \sum_1^n u_i\left(x_i\right) + min\left(h\left(x_0 + \sum_1^n u_i\left(x_i\right) - \overline{U}\right), 0\right) \tag{1}$$

where x_0 is numeraire good produced only by labour with the constant return to scale, and the input-output coefficient equals 1 ($x_0 = L_0$). The numeraire good could be defined as the import good or the export good. By definition, its domestic price and world price are equal to 1. Under a competitive labour market, the wage rate is equal to 1. x_i is consumption of good i, $i = 1, 2, \cdots, n$. All the normal goods require labour- and sector-specific inputs with fixed supply in the economy exhibiting constant returns to scale. While the specific factors are immobile across sectors, labourers have free mobility in the economy. With the wage rate equal to one, the returns to the specific factor owners depend only on the domestic market price p_i denoted by $\pi_i(p_i)$. The supply of good i is denoted by $y_i\left(p_i\right) = \pi_i'\left(p_i\right)$, which is an application of Hoteling's lemma.

Following Freund and Özden (2008), we introduce behaviour features into consumer utility through a $h(\bullet)$ function. The $h(\bullet)$ function is called 'gain-loss' utility[1] (Dissanayake, 2014), and its first derivative is positive and the second derivative is negative. In other words, the gain-loss term is increasing in the difference between the actual utility level and the reference utility level indicated by $\overline{U}$. $\overline{U}$ is an individual's reference utility derived from consuming a reference consumption bundle. The function takes a negative value when the actual utility is lower than the reference level, and zero otherwise. With the above preferences, an individual consumes $x_i = d_i(x_i)$ normal goods, $i = 1, 2, \cdots, n$, where demand is the inverse of $U_i'\left(x_i\right)$ and $x_0 = E - \sum_1^n p_i x_i$.

The utility equation could be rewritten as:

$$W_i\left(p_i\right) = E + s\left(p_i\right) + min\left(h\left(E + s\left(p_i\right) - \overline{U}\right), 0\right) \tag{2}$$

where $s\left(p_i\right) = \sum_{i=1}^n u_i\left(\underline{d_i}\left(\underline{p_i}\right)\right) \underline{- \sum_i} p_i d_i\left(p_i\right)$ indicates the consumer surplus. If we denote the reference level of utility as $\overline{U} = \overline{E} + \overline{S}(p)$, then the above function (2) could be rearranged as:

$$W_i\left(p_i\right) = E + s\left(p_i\right) + min\left(h\left(E + s\left(p_i\right) - \overline{E} + \overline{S(p)}\right), 0\right) \tag{3}$$

The wedge between the domestic market price (p_i) and the world market price (p_i^w) is t_i^s, created by the government's price-distorting policy. The relationship between the domestic market price and the world price is simply expressed as: $p_i = p_i^w + t_i^s$.

The assumed aim of the government is to maximise its objective by implementing price-distorting policies, with the ultimate objective of being to stay in office and control the country's power. In the context of China, there is no formal lobby group to make monetary contributions to the government. However, interest groups can express their unwillingness or anger through, for example, creating social unrest. We model the government's political objective function as the summation of total political support from politically sensitive groups, and the aggregate welfare of the economy as the following linear function:

$$OFG = \sum_{i \in g} PS_i + \varphi \sum_{i=1}^n W(t_i^s)\varphi \geq 0 \tag{4}$$

where OFG is the objective function of the government; $\sum_{i \in g} PS_i$ is the political support from politically sensitive groups indicated by g; $W(t_i^s)$ is the aggregate social welfare; and φ represents the weight that the government puts on aggregate social welfare.[2] The value of φ is a positive value. We propose that political support is a strictly monotonic increasing function with respect to the welfare of the politically sensitive group. Equivalently, the government's objective function could be rewritten as:

[1]The price of the numeraire goods is constant. Therefore, the utility function is linear in x_0 but not other normal goods.

[2]In reality, the parameter φ may not be a constant, for the government may alter its priorities in responding to different situations. However, assuming a changing φ will complicate the model but not change its main implications.

$$\Omega = \sum_{i \in g} H\left(t_i^s\right) + \varphi \sum_{i=1}^{n} W(t_i^s),\ \varphi \geq 0 \tag{5}$$

In this model, the government of China considers politically sensitive areas that are geographically related to producing a specific product. The government would like to consider that region's welfare more than the welfare of other groups, which is expressed as follows:

$$\sum_{i \in g} H\left(t_i^s\right) = a_g l + a_g \sum_{i=1}^{n} t_i^s M_i\left(p_i\right) + \sum_{i \in g} \pi_i\left(p_i\right) + a_g \sum_{i=1}^{n} s_i(p_i) \tag{6}$$

where g in the third term is a set of politically sensitive groups which have the higher power to argue with the government, and a_g is the proportion of individuals in the total population who belong to the politically sensitive groups. For the second term in Equation (5), the aggregate social welfare consists of four terms:

$$\sum_{i=1}^{n} W(t_i^s) = l + \sum_{i=1}^{n} t_i^s M_i(p_i) + \sum_{i=1}^{n} \pi_i(p_i) + \sum_{i=1}^{n} s_i(p_i) \tag{7}$$

where l is the total labour income (wage rate is one and total labour supply is l); $\sum_{i=1}^{n} t_i^s M_i(p_i)$ denotes total tariff revenue and $M_i(p_i)$ is the trade value for product i; $\sum_{i=1}^{n} \pi_i\left(p_i\right)$ is the total return for specific factors; and $\sum_{i=1}^{n} s_i(p_i)$ is the total consumer surplus.

The equilibrium optimal tariff rate can be solved by maximising the government's objective function (Equation 7) with respect to the trade protection level (t_i^s):

$$t_i^s = arg\max\left(\sum_{i \in g} H\left(t_i^s\right) + \varphi \sum_{i=1}^{n} W\left(t_i^s\right)\right) \tag{8}$$

Regarding the model assumptions, the individuals' preferences depend on the difference between the actual consumption and the reference consumption levels. Because of this, the form of the government objective function depends on the difference between the equilibrium domestic market price and the reference price set by the government authority. Therefore, three scenarios are considered in turn in analysing the optimal trade policy for the government to maximise its object function: when the equilibrium price exactly equals, is lower than, or is higher than the reference price.

2.1.1 | Case 1: The equilibrium domestic price equals the reference price

When the domestic equilibrium market price equals the reference price, the individuals will have a utility function excluding the loss-gain term. The welfare of the politically sensitive groups and the aggregate social welfare are the same as Equations (6) and (7), respectively. Substituting the two equations into the government objective function (Equation 5), we get:

$$\Omega = \left(\varphi + a_g\right) l + \left(\varphi + a_g\right) \sum_{i=1}^{n} (t_i^s M_i(p_i) + s_i\left(p_i\right)) + \sum_{i=1}^{n} (\varphi + g_i) \pi_i(p_i) \tag{9}$$

Trying to choose the optimal trade protection vector (based on political support schedules) is equivalent to maximising the objective function of the government with respect to the protection level t_i^s. The first-order condition is given as the following Equation (10) by using Roy's identity $\left(\frac{\partial s(p_i)}{\partial p_i} = -d_i\left(p_i\right)\right)$ and Hotelling's lemma $\left(\pi_i'\left(p_i\right) = y_i\left(p_i\right)\right)$, where $d_i(p_i)$is domestic demand and $y_i\left(p_i\right)$is the domestic supply for product i.

$$\left(\varphi + a_g\right)\left[-d_i\left(p_i\right) + t_i^s M_i'\left(p_i\right) + M_i\left(p_i\right)\right] + \left(\varphi + g_i\right) y_i\left(p_i\right) = 0 \tag{10}$$

The politically optimal policy could be solved as

$$\frac{t_i^s}{p_i} = \left[\frac{g_i - a_g}{\varphi + a_g}\right]\frac{z_i}{e_i} \tag{11}$$

where $e_i = -M_i'\left(p_i\right)\frac{p_i}{M_i(p_i)}$ is the import demand or export supply elasticity of good i; and $z_i = \frac{y_i(p_i)}{M_i(p_i)}$ is an equilibrium ratio of domestic output to imports (negative for exports).

In the following, we change the tariff to ad valorem format:

$$\frac{t_i}{1 + t_i} = \left[\frac{g_i - a_g}{\varphi + a_g}\right]\frac{z_i}{e_i} \tag{12}$$

From the above optimal protection, politically sensitive groups receive positive protection. This is because g_i is an indicator variable: if the group who own a specific factor to produce a politically sensitive product, the value equals one, and zero otherwise. The other effect of one specific product is the output to import ratio. If that one specific product accounts for a large share, the specific group has more power to gain from price distortions. The protection level is negatively related to the import demand elasticity. The other two variables are the weight on the aggregate social welfare and the share of the population that belongs to the politically sensitive groups. In short, the predictions of the above politically optimal trade protection are:

Benchmark results

Politically sensitive groups receive positive protection. The protection level is positively related to the output–import ratio; negatively proportional to the share of the total population in the politically sensitive regions, the import demand elasticity, and the government's weight on the aggregate social welfare.

2.1.2 | Case 2: The equilibrium domestic price is below the reference price

What should be the trade protection level when the equilibrium price is lower than the reference price? In this situation, the return of specific factors will be low due to the decrease in the output price. Therefore, the negative deviation of price from its reference price will result in further welfare loss for the producers through the loss aversion term if they produce that product. Following the same argument as Dissanayake (2014) and Freund and Özden (2008), the producers pay more attention to the return of factor income than to changes in tariff revenue and consumer surplus. The other individuals, whose specific factors are not used to produce this product whose price decreases, are net buyers. The price decrease of this product will contribute to the positive gain of net indirect utility to consumers. However, the positive gain in the loss–gain function does not add additional utility gain. Based on these arguments, the standard aggregate social welfare (Equation 7) becomes the following form:

$$\begin{aligned}\sum_{i=1}^{n} W\left(t_i^s\right) &= l + \sum_{i=1}^{n} t_i^s M_i\left(p_i\right) + \sum_{i=1}^{n} \pi_i\left(p_i\right) + \sum_{i=1}^{n} s_i\left(p_i\right) \\ &+ min\left(-\sum_{i=1}^{n} a_i N h\left(\frac{\overline{\pi_l} - \pi_i\left(p_i\right)}{\alpha_i N}\right), 0\right)\end{aligned} \tag{13}$$

The last term in the above equation is the loss aversion part from producers whose specific factors experience return decreases, leading to negative social welfare. In the loss aversion term, α_i denotes the share of the population who owns one specific factor i, and N is the total population. In the context of cotton in Xinjiang, loss aversion's effect on trade protection works through the political sensitive group, such as the population employed in cotton production. Note that Xinjiang accounts for nearly 20 per cent of global cotton production, and more than 50 per cent of China's total cotton production (Hendrix & Noland, 2021). In the empirical part, because the data on the employment share of cotton sector are unavailable, we adopt three proxies to examine the effect of Xinjiang cotton production on trade protection (see details in Section 4.2). Following the same logic, the loss aversion term in Equation (13) could be substituted into Equation (6) to get the welfare of the politically sensitive groups. In this case, the government objective function is shown in Equation (5) becomes:

$$\begin{aligned}\Omega &= \left(\varphi + \alpha_g\right) l + \left(\varphi + \alpha_g\right) \sum_{i=1}^{n} \left(t_i^s M_i\left(p_i\right) + S_i\left(p_i\right)\right) + \sum_{i=1}^{n} \left(\varphi + g_i\right) \pi_i\left(p_i\right) \\ &+ min\left(-\sum_{i=1}^{n} \left(\varphi + g_i\right) a_i N h\left(\frac{\overline{\pi_l} - \pi_i\left(p_i\right)}{\alpha_i N}\right), 0\right)\end{aligned} \tag{14}$$

Solving this equation with respect to the optimal trade distortion and writing it in ad valorem format on good i gives:

$$\frac{t_i}{1 + t_i} = \left[\frac{g_i - a_g + \left(\varphi + g_i\right) h'\left(\cdot\right)}{\varphi + a_g}\right] \frac{z_i}{e_i} \tag{15}$$

Comparing the optimal protection level with Equation (18), the only change is the term from the numerator $\left(\varphi + g_i\right) h'\left(\cdot\right)$. According to the characteristics of the loss aversion function, the first derivative is positive, illustrated as $h'\left(\cdot\right) > 0$, and then $\left(\varphi + g_i\right) h'\left(\cdot\right) > 0$. Thus, the optimal protection level is higher compared with the protection level when the equilibrium price equals to the reference price. When trade protection is higher, the domestic market price must be higher than the world price. If the equilibrium domestic price goes lower than the reference price, the world price is lower than the reference price. Hence the following Proposition:

Proposition 1 When the world price is below its reference price, that is $p_i^w < \overline{p}_i$, the government introduces a higher distortion than that when the world price is at the reference level.

$$\left[\frac{g_i - a_g + \left(\varphi + g_i\right) h'\left(\cdot\right)}{\varphi + a_g}\right] \frac{z_i}{e_i} > \left[\frac{g_i - a_g}{\varphi + a_g}\right] \frac{z_i}{e_i} \tag{16}$$

2.1.3 | Case 3: The equilibrium domestic price is above the reference price

If the equilibrium price goes above the reference price, producers gain. However, net buyers whose specific factors do not experience a price increase will lose. The loss aversion term enters the objective function of the government due to this loss of consumers' surplus. For the special case of cotton, the gain for producers dominants the situation. The difference between the gains in factor income and the loss in consumer surplus is positive for producers who are net sellers. In this scenario, the loss aversion term from the consumers' perspective is added to the standard aggregate social welfare (Equation 7).

$$\begin{aligned}\sum_{i=1}^{n} W\left(t_i^s\right) &= l + \sum_{i=1}^{n} t_i^s M_i\left(p_i\right) + \sum_{n=1}^{n} s_i\left(p_i\right) + \sum_{i=1}^{n} \pi_i\left(p_i\right) \\ &+ min\left(-\left(1-a_i\right) Nh\left(\frac{\sum_{l=1}^{n} t_i^s M_l - \sum_{l=1}^{n} t_i^s M_l\left(p_i\right) + \overline{\sum_{l=1}^{n} s_l} - \sum_{i=1}^{n} s_i\left(p_i\right)}{N}\right), 0\right)\end{aligned} \tag{17}$$

where a_i is the share of individuals that experience a price increase in the good they produce; $1 - a_i = \beta_i$ represents the share of individuals who are net buyers of the good that experience a world price increase.

The government objective function (Equation 5) could be rewritten as:

$$\begin{aligned}\Omega &= \left(\varphi + \alpha_g\right) l + \left(\varphi + a_g\right) \sum_{i=1}^{n} \left(t_i^s M_i\left(p_i\right) + s_i\left(p_i\right)\right) + \sum_{i=1}^{n} \left(\varphi + g_i\right) \pi_i\left(p_i\right) \\ &+ min\left(-\left(\varphi\beta_i + \beta_i^g\right) Nh\left(\frac{\sum_{l=1}^{n} t_i^s M_l - \sum_{l=1}^{n} t_i^s M_l\left(p_i\right) + \sum_{l=1}^{n} s_l - \sum_{i=1}^{n} s_i\left(p_i\right)}{N}\right), 0\right)\end{aligned} \tag{18}$$

where β_i^g is the share of individuals, who are net buyers of the good that experiences a world price increase in the politically sensitive groups. β_i^g is smaller or equal to β_i in the economy.

Finally, we write the politically optimal protection in ad valorem form on good i as:

$$\frac{t_i}{1 + t_i} = \left[\frac{g_i - a_g - \left(\varphi\beta_i + \beta_i^g\right) h'(\cdot)}{\varphi + a_g + \left(\varphi\beta_i + \beta_i^g\right) h'(\cdot)}\right] \frac{z_i}{e_i} \tag{19}$$

Compared with the benchmark protection level (Equation 12), the only different term entering the politically optimal solution is $\left(\varphi\beta_i + \beta_i^g\right) h'(\cdot)$, which takes a positive value according to the characteristics of the loss aversion function. The decrease of the numerator and the increase of the denominator lead to a decrease in the ratio. Thus the protection level is lower than that in the scenario where the equilibrium domestic price equals the reference price. In addition, when the protection level is lower and the domestic market price is lower than the reference price, the world market price must be lower than the reference price. Proposition 2 summarises this conclusion as follows:

Proposition 2 *When the world price goes higher than the reference price, that is $p_i^w > \overline{p}_i$, the government introduces lower distortions than that when the world price is at its reference price.*

$$\left[\frac{g_i - a_g - \left(\varphi\beta_i + \beta_i^g\right) h'(\cdot)}{\varphi + a_g + \left(\varphi\beta_i + \beta_i^{ps}\right) h'(\cdot)}\right] \frac{z_i}{e_i} < \left[\frac{g_i - a_g}{\varphi + a_g}\right] \frac{z_i}{e_i} \tag{20}$$

Compared with the pure lobby group model, this paper alternatively combines the interest group model with the political support model to analyse the effect of loss aversion on trade distortion in one-party dominated countries. According to Przeworsky (1991), one of the main differences between democratic and authoritarian regions lies in the level of free participation by independent organisations. In democratic countries, the lobby groups would more actively lobby the government, while in one-party government, the government would consider more the benefits of the political sensitive group, especially those tend to create social unrests. Lobby groups in democratic countries have stronger powers to influence the policymaking. The theory rests on the premise that well-organised groups with specialised interests can be more effective in advancing their economic objectives in the democratic society (Moon et al., 2016). The effects of behaviour characteristics (i.e., loss aversion and reference dependence) on trade policy making absolutely works in a pure lobby group model in a democratic society as suggested by Freund and Özden (2008). In the case of one-party dominated country, however, the government would like to get political support from different interest groups in order to keep in office. In this setting, theoretically, one-party dominated government only needs to worry about groups that have real power (Banerji & Ghanem, 1995), like cotton producers in Xinjiang. In addition, the one-party dominated country is endowed with stronger power to redistribute incomes across different interest groups, so the effect of behaviour characteristics on trade protection is ambiguous. Thus, in our paper, we try to explore whether the characteristics still work through the political support model in the context of one-party dominated country. Detailed comparisons of the different theory predictions between our model (which is based on the one-party country context) and the model of Freund and Özden (2008) (which is based on the democratic country context) are presented in Appendix S3.

2.2 | Do terms of trade effects matter?

From the above general equilibrium model, we can predict the politically optimal tariff response in a small open economy to changes in the world market price. However, the politically optimal policies for a large open economy take into account a country's ability to influence its international terms of trade (Feenstra, 2016, p. 213). Broda et al. (2008) argue that market power explains more of the tariff variation than a commonly used political economy variable. Dissanayake (2014) and Freund and Özden (2008) ignore terms of trade. In Appendix S2, we consider the case of a large economy by considering the role of terms of trade effects. We get that these theoretical predictions for a small open economy are still relevant if terms of trade matter to the government, which is further empirically tested in Section 4.

3 | GEOGRAPHY, POLITICALLY SENSITIVE PRODUCTS AND PREFERENCE

3.1 | Geography and politically sensitive products

Policy pressure arises from the policy preferences of self-interested agents. Economic actors can organise to influence government policy to their advantage because of the spatial distribution of economic endowments (Chase, 2015). Geography can sometimes shape an individual's preferences, collective action and aggregate preferences of the government if the endowment factor is located geographically in particular ways. Self-interest can be pursued by creating social unrest, sending petitions to the central government or otherwise fighting for their rights. Regions with a high proportion of minorities in the total population can be highly sensitive politically, as can ones in which a product is concentrated in just one politically sensitive region. A formal definition of a politically sensitive product, drawing on Jean et al. (2011), could be:

> A politically sensitive product is one whose output is produced using a specific endowment factor geographically located in a politically sensitive region, and the producers are vulnerable to changes in government policy affecting that product.

3.2 | Politically sensitive regions: Xinjiang

The geographic location and the large share of Muslims in Xinjiang[3] make it a politically sensitive region. The largest of China's administrative regions, Xinjiang borders eight countries—Mongolia, Russia, Kazakhstan, Kyrgyzstan, Tajikistan, Afghanistan, Pakistan and India. It is located in the far Northwest of China, and transportation links to the east through the central area of mainland China are weak. The shares of the total population of each province that is a minority are listed for 2014 in Table A1 in Appendix S1. Xinjiang ranks second only to Tibet out of the 26 provinces whose statistics are available, with 60% of its total population being Uyghur.

The higher the share of minorities in the province, the more they share common interests and preferences. The minorities are more likely to organise political groups to fight against local or central governments or to force the government to allocate benefits to them. In 2009, the biggest conflicts between Han and Uighur people occurred. In that social unrest, almost 200 people were killed, 1721 people were injured and 1000 people were arrested by the government. In 2014, there are 9 social unrests related to the Xinjiang Uighur group whose number is much higher than in other years.

3.3 | The role of cotton in Xinjiang

Xinjiang's cotton sector plays an important role in China. According to the latest data from the National Bureau of Statistics of China, the cotton yield in Xinjiang in 2018 was 131 kg per mu, which was 10% above the national average. Xinjiang's share of the total production of cotton in China was 30% in 2002, but then it sharply increased to 62.5% by 2015 and to 76% by 2019. According to the China Cotton Almanac, cotton accounts for 65% of its crop sector and 1/3 of its total agricultural sector in 2013. Figure A1 in Appendix S1 illustrates the cotton production geography in China in 2012 when Xinjiang's share was 52%.

The Chinese government is more likely to protect cotton planters due to the important role of cotton in employment and income in Xinjiang. Social unrest and agricultural price shocks have a positive relationship which has been tested recently by Arezki and Bruckner (2011) and

[3]Technically, the area is the Xinjiang Uyghur Autonomous Region (XUAR). For expositional convenience, we refer to it simply as Xinjiang.

Bellemare (2014). If a product is geographically concentrated in its production,[4] the Chinese government tends to protect the sector when considering major employment. Besides, those working as cotton planters are relatively unskilled. If the government does not protect the cotton sector, a higher unemployment rate may result and potentially lead to social and political unrest in Xinjiang. Maintaining social stability is an objective of China's cotton policies:

> China's cotton policy is cognizant of social stability. They want to control rioting in the Xinjiang province, where most of the cotton is grown.
>
> ---------------Elton Robinson (15. March 2013)[5]

In short, cotton is a politically sensitive product whose production is geographically concentrated in Xinjiang province—a politically sensitive region.

3.4 | Cotton trade policy in China

China is the world's largest cotton producer, consumer and importer in the world (Appendix S1: Table A2). The trade policy has been largely focused on managing import flows to competing interests of consumers and cotton farmers.[6] A Sliding Scale Duty (SSD) system has been in place since 2005.

In China, its in-quota import volume includes regular quotas and additional quotas permitted by the Sliding Scale Duty system. As illustrated in Figure 1, within the regular import quota, the import tariff is very low at 1%. If the import exceeds the sum of the regular quota and additional quota, the tariff is taken to the highest level of 40%. If the import volume belongs to additional quota, the government will implement a Sliding Scale Duty to calculate the tariff rate under the Sliding Scale Duty system, which is not allowed to be higher than 40%. China's actual Tariff Rate Quota (TRQ) system shows the tariff rate is fixed within the regular quotas. The fluctuations of tariff rates depend on the additional quotas' context.

Figure 2 gives the composition of cotton imports. The primary instruments determining China's cotton imports are import size, timing and conditionality of quotas. Most of China's cotton imports are under the 'Sliding Scale' quota (SSQ).

This paper mostly focuses on the variation of the import tariff. It analyses how the tariff rate is calculated based on the Sliding Scale Duty within the additional quotas range. The tariff rate is inversely related to the world price. In addition, cotton producers are almost always net sellers in the short-term, which makes them different from staple food producers. The income effects due to a product price change are not ambiguous for cotton planters: they gain when facing domestic market price increases, and vice versa.

Although the current article focuses on the role of political sensitivity in the formation of the cotton trade policy, it was never the sole consideration for cotton trade policy determination. After WTO accession, China can legally use the above-quota tariff to set high protection

[4]The coal sector in some European countries receives higher protection and government subsidy. The geographically concentrated industry is often a major employer in a town or city and involves a small number of towns or cities (Anderson, 1995b).

[5]See 'Chinese cotton policy-Social stability, not trade'. http://deltafarmpress.com/cotton/chinese-cotton-policy-social-stability-not-trade.

[6]Cotton consumers are mills in textile industry rather than citizens, because the raw cotton is the intermediate input to produce clothes.

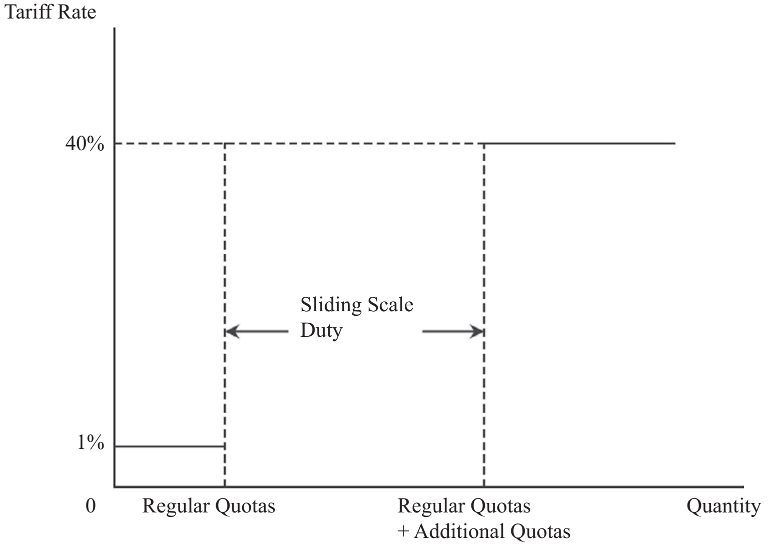

FIGURE 1 China's actual Tariff Rate Quota system. *Source*: Wang et al. (2014)

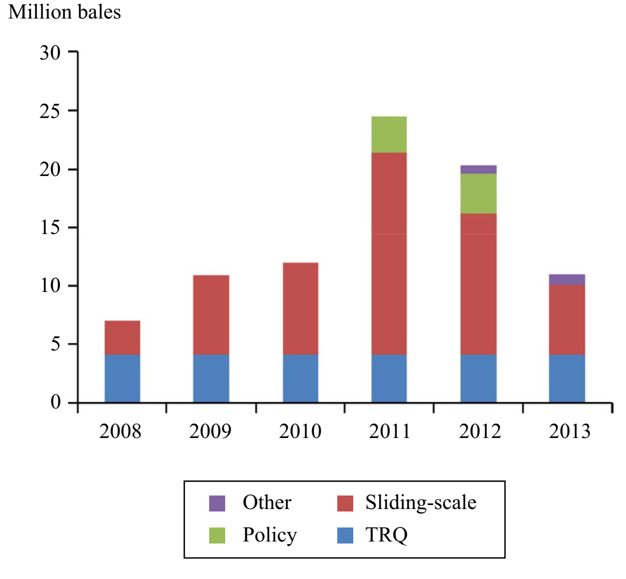

FIGURE 2 China's cotton import composition during 2008–2013. *Notes*: 'Policy', for example imports by China National Cotton Reserves Corporation (CNCRC); 'Other': imported at full 40% WTO bound tariff. *Source*: MacDonald et al. (2015)

to cotton producers. In fact, adopting the slide scale tariff was a compromise to cotton users, which had something to do with regional GDP and non-agricultural employment as well as exports of labour-intensive products. In addition, in determining market intervention policies for those truly political sensitive products, the Chinese government often places primary emphasis on quantities rather than prices. To some extent, the reform of cotton policy in recent years was a response to overstock of domestically produced cotton and relocation of textile production capacity (driving mainly by rising labour cost) and tariff was not the sole policy instrument used to stabilise cotton market. For these reasons, our theoretical model considers both the loss aversion of producers and consumers. In addition, in our empirical identification, we adopt instrument variable approach to address the endogeneity and hence separate the causal effect of political sensitivity from other determinants of cotton protection.

4 | EMPIRICAL TEST

In this section, we investigate the cotton protection in China empirically to test our theoretical predictions. The cotton sector provides an ideal experiment to analyse trade policy formations under loss aversion. First, China is the largest importer for cotton in the world. Second, Cotton is a special agricultural product, and it makes up a relatively smaller share of expenditure for poor families, and in most cases, they are net sellers (Martin, 2009), which is exactly the same as our model assumptions. During price spikes periods, the income of the cotton producer dominates the producers' 'loss–gain' utility. The Chinese government has set a cotton reference price every year.[7] This helps us to test the effects of loss aversion and reference dependence on trade policy formation more accurately.

4.1 | Data sources

In the empirical part, we apply monthly, quarterly, and annual frequency data to conduct the empirical model. Trade protection is measured by NRA calculated using the domestic cotton price and the world market price.[8] China cotton monthly prices are mainly collected from the China Cotton Almanac from January 2005 to October 2014, and the data from November 2014 to December 2015 are compiled from the website of China Cotton.[9] The international cotton price is from the National Cotton Council of America (NCCA) between January 2005 and December 2015.[10] To measure the world cotton price in Renminbi (RMB), the monthly exchange rate data are collected from the Board of Governors of the Federal Reserve System (2005–2015).[11] The reference price is the annual value set by the Chinese government at the beginning of each year. The reference price does not stick to a fixed value, and it increased from 10029 Yuan/Ton in 2005 to 12935 Yuan/Ton in 2015.

Concerning seasonal fluctuations, we add the harvest cycle as the control variable measured by $Sin(\bullet)$ and $Cos(\bullet)$ functions. These data are created by combining the value of π and code numbers of the domestic price series. As a robustness check, a seasonal dummy variable is also

[7]Freund and Özden (2008) set the reference price as the average of the world price.

[8]Here, we use the data in different frequency to calculate monthly, quarterly and annual NRAs that will be used in the main analyses and robustness checks in the following. See 'Measuring distortions to agricultural incentives, Revisited' Anderson et al. (2008) for more details of NRA indicator.

[9]See http://www.cncotton.com/.

[10]Notice that there are multiple sources of both China's domestic prices and the world market prices of cotton and different NRAs may be derived using different price series. For this reason, we choose to use the data from the most frequently used (and possibly the most reliable) data sources (i.e. the *China Cotton Almanac* and *National Cotton Council of America*).

[11]See http://www.federalreserve.gov/releases/h10/hist/default1989.htm.

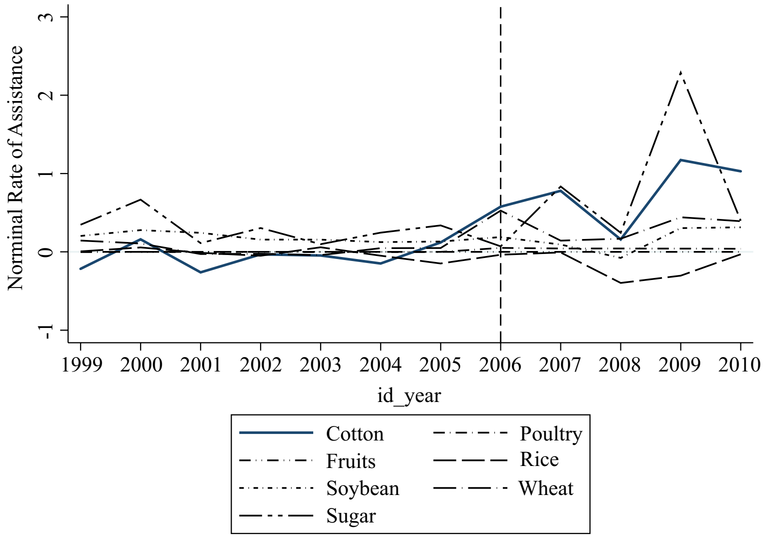

FIGURE 3 Cotton compared with other agricultural products' trade protection. *Source*: Authors' calculation

applied to control for the production cycles. Meanwhile, in order to test for it being a politically sensitive product, the annual panel data method is implemented by covering 11 important agricultural products and the NRA data are from Anderson and Nelgen (2013). To test the potentially confounder of terms of trade effect, we use the net barter terms of trade index as proxy indicator from the World Bank.

4.2 | The effects of political sensitivity on cotton trade protection

One prediction of our theoretical model is that politically sensitive products receive more trade protection relative to non-politically sensitive products. Figure 3 shows the difference in trade protection between politically sensitive cotton and other agricultural products. To make the figure easy to read, here we select only six important agricultural products (i.e., rice, wheat, soybean, poultry, fruits and sugar) to compare with cotton. In the following regression analyses, we will include all 11 products. While cotton is mainly produced in politically sensitive Xinjiang, the other six products are not concentrated in politically sensitive regions of China. Therefore, the difference in protection level between cotton and other products can partly reveal the effect of political sensitivity on cotton protection. Trade protection for different types of products is measured by the NRA. We find that cotton protection is higher than other five products except sugar since 2006. In the following econometric analysis, after controlling for other confounding factors, we find that cotton protection is higher even than sugar.

To provide more reliable empirical evidence on the high protection level of cotton, we estimate the following equation:

$$\Delta Protect_{it} = \alpha + \sum_{i=1}^{I} \beta_i dummy_i + Z_t \Upsilon + \varphi_t + \varepsilon_t \tag{21}$$

where $\Delta Protect_{it}$ is the change in the yearly protection level of product $i$in year t, $dummy_i$ is the dummy of product i, Z_t is a vector of control variables, φ_t is the year fixed effect, $\varepsilon_t$is an error term, $\alpha$is a constant term, and β_i andΥ are coefficients. We include seven potentially important determinants of protection level as control variables: changes in world price, self-sufficiency ratio, production value in GDP, consumption value in total agriculture products, production value in total agriculture products, terms of trade and initial stock of the product. Data for these control variables are derived from the World Bank and China Cotton Almanac. The coefficient β_i reveals the product-specific protection after accounting for the effects of other determinants of changes in protection, and a higher β_i means that crop $i$received more protection.

As reported in Table 1, we find that the coefficient of the cotton dummy is positive and statistically significant, and this finding is robust to the control variables included (we increase the number of control variable from Column (1)–(5)). In contrast, we find that the coefficients of the dummies of other products are mainly negative or statistically insignificant.[12] Especially, the coefficient of the dummy of sugar, which has a higher protection level than cotton as presented in Figure 3, is statistically insignificant. In addition, agricultural transportation cost does matter for price and trade policy (Beghin & Schweizer, 2021; Korinek & Sourdin, 2010). Thus, cotton transportation cost is additionally controlled for in Column (6).[13] The estimated coefficient of cotton transportation cost is positive and large, although not statistically significant at the conventional level. Controlling for the cotton transportation cost significantly increased the significance level and effect size of the coefficient of the cotton dummy, confirming the importance of including this control variable. All these evidences together suggest that cotton has a higher protection level than other products when controlling for other determinants of trade distortion.

The reader may also concern that Xinjiang problem is the mixture of economic and political problems. In an effort to separate the effect of the economic importance of cotton in Xinjiang on cotton protection in China, we adopt three proxy indicators representing the economic role of cotton in Xinjiang and estimate the effects of these indicators on trade protection.[14] The first indicator is the ratio of cotton production per capita in Xinjiang relative to the average of other regions in China, the second is the ratio of cotton planting area per capita in Xinjiang relative to the average of other regions, and the third is the cotton trade share in Xinjiang relative to the average of other regions. We regress annual changes in cotton protection on each of the three indicators while controlling for various potential confounding factors as used in model (21). As reported in Table 2, each of these indicators has a significantly positive effect on cotton protection, suggesting that the economic role of cotton in Xinjiang is an important determinant of cotton protection. Although this empirical exercise does not directly separate the effect of economic importance from the effect of political importance (which cannot be measured due to the lack of data), it supports that economic importance of cotton in Xinjiang could be an important and independent driven force of cotton protection in China.

[12]The dummy of wheat is omitted due to multicollinearity.

[13]The data are derived from https://stats.oecd.org/Index.aspx?DataSetCode=MTC.

[14]Note that although the theoretical model uses the share of population employed in cotton production to measure the importance of cotton sector in Xinjiang, the data on the share of the population employed in cotton production are not available. As such, the empirical analysis adopts three indirect measures of the economic importance of cotton in Xinjiang.

TABLE 1 The effect of politically sensitive products on the changes of trade protection

Variables	Δ Protection level (1)	Δ Protection level (2)	Δ Protection level (3)	Δ Protection level (4)	Δ Protection level (5)	Δ Protection level (6)
Cotton dummy	0.011**	0.011**	0.010*	0.010*	0.010*	0.046***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.010)
Sugar dummy	0.007	0.005	0.006	0.006	0.006	0.005
	(0.005)	(0.007)	(0.007)	(0.007)	(0.007)	(0.019)
Fruit dummy	−0.002	−0.003	−0.002	−0.002	−0.002	−0.000
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.011)
Maize dummy	0.001	0.001	0.002*	0.002*	0.002*	0.028***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)
Milk dummy	−0.039***	−0.039***	−0.040***	−0.040***	−0.040***	−0.006
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.004)
Pig meat dummy	−0.001	0.000	0.002	0.002	0.002	0.006
	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.009)
Poultry dummy	−0.026***	−0.027***	−0.026***	−0.026***	−0.026***	0.003
	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)	(0.007)
Rice dummy	−0.014***	−0.013**	−0.010***	−0.010***	−0.010***	0.002
	(0.002)	(0.005)	(0.004)	(0.004)	(0.004)	(0.006)
Soybean dummy	−0.020**	−0.021**	−0.021**	−0.021**	−0.021**	−0.012
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.012)
Vegetable dummy	0.006	0.007	0.008*	0.008*	0.008*	−0.007
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.015)
Δ ln(world price)	−0.406***	−0.415***	−0.397***	−0.397***	−0.397***	−0.186*
	(0.069)	(0.083)	(0.087)	(0.087)	(0.087)	(0.095)
Δ Self-sufficiency ratio	−0.451	−0.458	−0.493	−0.493	−0.493	−0.384
	(0.290)	(0.286)	(0.306)	(0.306)	(0.306)	(0.252)

(continues)

TABLE 1 (continued)

Variables	**Δ Protection level (1)**	**Δ Protection level (2)**	**Δ Protection level (3)**	**Δ Protection level (4)**	**Δ Protection level (5)**	**Δ Protection level (6)**
Δ Production value in GDP		0.408	0.930	0.930	0.930	−4.920*
		(0.677)	(0.587)	(0.587)	(2.639)	(2.639)
Δ Consumption value in total agriculture			−0.474	−0.474	−0.474	0.252
			(0.477)	(0.484)	(0.477)	(0.484)
Δ Terms of trade				0.036*	0.041	0.029
				(0.021)	(0.025)	(0.025)
Δ Ln(Beginning stock)					−0.018	−0.290***
					(0.031)	(0.105)
Δ Transportation cost						0.465
						(0.806)
Constant term	0.037***	0.035***	0.034***	0.141**	0.291	−0.011
	(0.012)	(0.012)	(0.013)	(0.058)	(0.295)	(0.118)
Year-fixed effect	Y	Y	Y	Y	Y	Y
Observations	300	300	300	300	300	300
Number of products	11	11	11	11	11	11
Adj. R^2	.4819	.4822	.4831	.4833	.4833	.331

Notes: (1) Robust standard errors are reported in the parentheses; (2) *significant at 10%; **significant at 5%; ***significant at 1%.

TABLE 2 The economic role of cotton in Xinjiang and the cotton protection levels

	Dependent variable: Changes in the cotton protection level		
Variables	**(1)**	**(2)**	**(3)**
The ratio of cotton production per capita in Xinjiang relative to other regions	0.295*** (0.088)		
The ratio of cotton planting area per capita in Xinjiang relative to other regions		4.962*** (1.516)	
The cotton trade share in Xinjiang relative to other regions			2.285** (0.796)
Control variables	Y	Y	Y
Constant	−4.654*** (1.486)	−0.199 (0.227)	0.235 (0.172)
Observations	80	76	68
R^2	.495	.495	.901

Notes: (1) Robust standard errors are reported in the parentheses; (2) the control variables include transportation cost, self-sufficiency ratio, production value in GDP, consumption value in total agriculture, terms of trade and the initial stock; and (3) *significant at 10%; **significant at 5%; ***significant at 1%.

4.3 | The effects of loss aversion and reference dependence on cotton trade protection

This section empirically tests the effects of loss aversion and reference dependence on the variations of trade restriction in the China cotton sector, both when the world price is lower than the reference price and when it is higher than the reference price.

The relationship between cotton trade protection, the world market price, and the reference price is illustrated in Figure 4. We divide the period into six, depending on the level of world price compared with the reference price level. The dashed line indicates the world market price and the dotted line represents the level of China cotton trade protection. The horizontal line is the domestic reference price set by the government. When the world price is lower than the reference price, the trade protection level is higher, and when the world price is higher than that of the reference price, the cotton protection level is lower. This is consistent with the theoretical model predictions summarised as Propositions 1 and 2.

Although Figure 4 visually supports our theoretical predictions, it does not tell us if the effects of loss aversion and reference dependence are statistically significant. In the remaining of this section, we will provide rigorous tests of these predictions.

4.3.1 | Identification strategy

As detailed in the theoretical model, testing the effect of loss aversion and reference dependence on trade policy is identical to test the effect of world price on domestic trade distortion. Therefore, the test can be carried out by

$$\Delta TP_t = \alpha + \beta \Delta WP_t + \varphi \Delta Z_t + \varphi Trend + \varepsilon_t \quad (22)$$

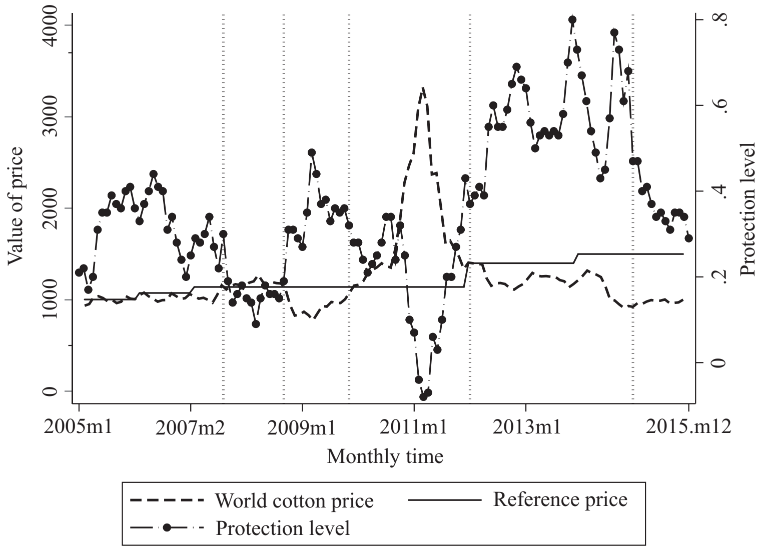

FIGURE 4 Relationships between world price, reference price and trade protection. *Source*: Authors' calculation

where ΔTP_t is the change in the cotton trade protection. α is a constant term and ΔWP_t is the changes of the world cotton price. Z_t is a vector of control variables, *Trend* is a time trend, and ϵ_t is an error term. The coefficient β indicates the effect of the loss version on trade policy.

A major concern of the OLS estimate of β is that the world price is potentially endogenous. For example, trade policy in China has the potential to affect world cotton prices, and the world cotton price is also likely to be correlated with omitted determinants of cotton protection. For this reason, we construct two potential instrument variables (IVs) for the world price. Our first IV is the weighted shock of world cotton production:

$$Totalshock1_t = \sum_{i=1}^{n} \frac{Trade_{i,2005}}{Totaltrade_{2005}} Productionshock_{it} \tag{23}$$

where $Productionshock_{it}$ is the production shock of cotton production in country i and year t. The data on country-level production shock are derived from the USDA Foreign Agriculture Service for all cotton production countries. $Trade_{i,2005}$ is cotton trade for country i in 2005, and $Totaltrade_{2005}$ is the world total cotton trade in 2005. Note that we construct the IV using the cotton trade volume at the beginning of the sample period (instead of the contemporary trade volume) as the weight because the contemporary trade volume is endogenous in the sense that it is affected by the trade protection policy. Our second IV is the weighted shock of world harvested area of cotton:

$$Totalshock2_t = \sum_{i=1}^{n} \frac{Trade_{i,2005}}{Totaltrade_{2005}} Harvestshock_{it} \tag{24}$$

where $Harvestshock_{it}$ is the shock to the area harvest of cotton in country i and year t, which is also derived from the USDA. Again, we use the cotton trade volume at the beginning of the sample period as the weight.

Although these two IVs are naturally correlated with world cotton prices, they may not satisfy the exclusion restriction of identification. For this reason, we also implement a two-stage estimator proposed by Lewbel (2012) that exploits heteroscedasticity for identification, which is not entirely dependent on exclusion restrictions. According to Lewbel (2012, 2019), if errors are heteroscedastic and some exogenous variables exist in the structural equation, identification can be realised with no exclusion restriction. Specifically, according to Lewbel (2012, 2019), identification is obtained in two steps: first, we regress the endogenous variable (world price) on all control variables and retrieve the residuals $\hat{\varepsilon}_{it}$; second, the estimated residuals $\hat{\varepsilon}_{it}$ are multiplied by $(z - \bar{z})$, where $z$is our IVs (the weighted production shock and area shock) and $\bar{z}$ is its mean.

4.3.2 | OLS estimates

Table 3 reports the OLS estimates by apply monthly time series data from May 2005 to December 2015. Because the time series for China cotton price, the world market price and cotton trade protection are not stationary, first differences of the three indicators are calculated. Column (1) reveals that a 10 per cent decrease of the international cotton price leads to the cotton trade protection level increasing by 0.065 points measured by NRA without controlling other variables. The effect of world price changes on China's cotton trade protection does not change when the robust standard error is applied in Column (2). In Columns (3) and (4), China's cotton price and the square term of world cotton price are added as control variables. The effect size increases by adding more control variables.

The price comparison between the world price and reference may have heterogeneous effects when the world price is higher or lower than the reference price. The interaction term is added into regression as shown in Column (5). The result shows that when the world price is higher or lower than the reference price, the result does not change greatly. As a further robustness check, we control the terms of trade effect in Column (6), and the terms of trade effect do not confound the effect of loss aversion, which is consistent with the theoretical predictions.

From Columns (1)–(6), the agricultural transportation cost is always included as a control variable. Column (1) shows that with the increase of transportation cost, the protection level increases. When we adding more control variables, however, the significant effect of the agricultural transportation cost disappears. As a robustness check presented in Appendix S1: Table A3, we also use the agricultural trade cost as an alternative control variable and find that the effect of loss aversion on trade protection still holds.

Agricultural price and trade protection may be affected by production cycles and a time trend. Therefore, we use the seasonal data to test the effect by controlling the harvest cycles through Sin(•) and Cos(•) functions, and agricultural transportation cost is controlled for. As reported in Column (1) of Table 4, although harvest cycles have no significant effect on trade protection fluctuations, it adds to the effect between changes of world price and changes of cotton trade protection levels in China. The time trend is added as a control variable as reported in Column (2) of Table 4. Quantitatively, a 10 per cent fall in the world market price leads to an improvement of 1.1 points in the NRA and the effect is statistically significant at the 1% per cent confidence level.

Following a traditional approach to control production cycles, a seasonal dummy variable is added to the model in Column (3) and time trends are further controlled in Column (4). In the

TABLE 3 World price changes on changes of cotton protection level using monthly data

Variables	Δ Protection level (1)	Δ Protection level (2)	Δ Protection level (3)	Δ Protection level (4)	Δ Protection level (5)	Δ Protection level (6)
Δ ln(world cotton price)	−0.651***	−1.346***	−3.129***	−3.150***	−2.412***	−2.418***
	(0.093)	(0.039)	(0.373)	(0.368)	(0.456)	(0.459)
Δ transportation cost	0.028*	0.002	−0.000	−0.001	−0.002	−0.001
	(0.016)	(0.005)	(0.005)	(0.006)	(0.006)	(0.005)
Δ ln(China cotton price)		1.416***	1.393***	1.391***	1.380***	1.380***
		(0.055)	(0.052)	(0.052)	(0.054)	(0.054)
Δ ln(square of world cotton price)			0.093***	0.094***	0.053**	0.053**
			(0.019)	(0.019)	(0.025)	(0.025)
Δ Cos(•)				0.000	0.000	0.000
				(0.002)	(0.002)	(0.002)
Δ Sin(•)				−0.002	−0.001	−0.001
				(0.002)	(0.002)	(0.002)
Δ ln(world cotton price)× Dummy(world price					0.094*	0.094*
higher or lower than reference price)					(0.050)	(0.050)
Terms of trade						0.000
						(0.000)
Constant	0.001	−0.000	−0.000	−0.000	−0.000	−0.004
	(0.004)	(0.001)	(0.001)	(0.001)	(0.001)	(0.013)
Observations	131	131	131	131	131	131
R^2	.462	.973	.979	.979	.980	.980

Notes: (1) (Robust) standard errors are reported in the parentheses; (2) * significant at 10%; ** significant at 5%; *** significant at 1%.

case of a large country, we control the terms of trade confounder in 5. The effect size of the world price changes on cotton protection changes is about 1.1 when the world market price decreases by 10%, and the effect is negative and statistically significant at 1% level.

Compared with the effect reported in Table 3, the effect size in Table 4 sharply increases by applying seasonal data. This increase could potentially be explained by the sticky and delayed changes of trade policy in response to world market price: the Chinese government prefers to adjust trade policy across seasons rather than altering trade policy promptly and sharply each month.

4.3.3 | IV estimates

To deal with the potential endogenous problem, we use the production shock and harvest area shock as the IVs of the world price. Table 5 presents the estimation results. The production shock and area harvest shock (constructed in Equations (23) and (24)) are used as IVs in Columns (1) and (2), respectively, and Column (3) uses both IVs. The two-stage least square (2SLS) estimates confirm that the world price has a significantly negative effect on the cotton trade protection.

TABLE 4 The effect of world price changes on domestic protection using seasonal data

Variables	Δ Protection level (1)	Δ Protection level (2)	Δ Protection level (3)	Δ Protection level (4)	Δ Protection level (5)
Δ ln(world cotton price)	−11.139***	−11.149***	−10.981***	−10.932***	−10.914***
	(1.393)	(1.461)	(1.257)	(1.293)	(1.311)
Δ transportation cost	0.064	0.056	0.065*	0.060	0.076
	(0.044)	(0.045)	(0.037)	(0.036)	(0.087)
Δ ln(China cotton price)	1.017***	1.000***	1.002***	0.986***	0.989***
	(0.180)	(0.179)	(0.180)	(0.181)	(0.185)
Δ ln(square of world cotton price)	0.522***	0.523***	0.515***	0.512***	0.512***
	(0.065)	(0.069)	(0.059)	(0.061)	(0.062)
Δ Cos(•)	0.007	0.011			
	(0.019)	(0.021)			
Δ Sin(•)	−0.012	−0.012			
	(0.023)	(0.023)			
Seasonal dummy			0.002	0.002	0.002
			(0.007)	(0.007)	(0.007)
Δ Terms of trade					0.002
					(0.006)
Time trend		Yes		Yes	Yes
Constant	0.001	0.011	−0.003	0.005	0.005
	(0.008)	(0.015)	(0.019)	(0.022)	(0.022)
Observations	43	43	43	43	43
R^2	.765	.768	.763	.765	.766

Notes: (1) (Robust) standard errors are reported in the parentheses; (2) *significant at 10%; **significant at 5%; ***significant at 1%.

TABLE 5 Instrument variable estimation results using seasonal data

Variables	(1) IV Δ Protection level	(2) IV Δ Protection level	(3) IV Δ Protection level	(4) Lewbel Δ Protection level	(5) Lewbel Δ Protection level	(6) Lewbel Δ Protection level
Δ ln(world cotton price)	−17.652	−11.787***	−8.563***	−16.225***	−20.463**	−16.758***
	(13.968)	(2.894)	(2.729)	(6.130)	(10.179)	(6.454)
Δ ln(China cotton price)	1.615	1.077***	0.781**	1.484***	1.873*	1.533***
	(1.267)	(0.295)	(0.329)	(0.545)	(0.970)	(0.581)
Δ transportation cost	0.017	0.059	0.082	0.027	−0.004	0.023
	(0.122)	(0.051)	(0.052)	(0.069)	(0.099)	(0.071)
Δ ln(square of world cotton price)	0.828	0.553***	0.401***	0.761***	0.960**	0.786***
	(0.657)	(0.136)	(0.128)	(0.288)	(0.478)	(0.303)
Δ Cos(•)	0.058	0.012	−0.013	0.047	0.080	0.051
	(0.117)	(0.031)	(0.029)	(0.052)	(0.088)	(0.055)
Δ Sin(•)	−0.002	−0.011	−0.016	−0.004	0.003	−0.003
	(0.041)	(0.024)	(0.023)	(0.028)	(0.038)	(0.029)
Constant	0.001	0.001	0.001	0.001	0.001	0.001
	(0.010)	(0.008)	(0.008)	(0.009)	(0.013)	(0.010)
IV	Production shock	Area shock	Both IVs	Production shock	Area shock	Both IVs
Observations	43	43	43	43	43	43
R^2	.550	.763	.732	.634	.325	.605

Notes: (1) (Robust) standard errors are reported in the parentheses; (2) *significant at 10%; **significant at 5%; ***significant at 1%.

The 2SLS estimates are larger than the OLS estimates presented in Table 4, confirming the importance of addressing the endogeneity bias using these IVs. Columns (4)–(6) of Table 5 show the estimation results using the approach of Lewbel (2012, 2019). All the estimated results confirm that the world price does negatively affect the cotton trade protection.

5 | CONCLUDING REMARKS

Behaviour characteristics, such as loss aversion and reference dependence, may have important effects on the short-term changes of the government's agricultural trade policy. Freund and Özden (2008) provides the first theoretical model that incorporates loss aversion and reference dependence to explain government's trade protection in countries with group lobby and monetary contribution. However, group lobby and monetary contribution may not be efficient in one-party dominated countries such as China, and, therefore, their model cannot be directly applied to one-party dominated countries.

Based on the model of Freund and Özden’s (2008), the current article develops a political support model characterised by spatial dimensions of interest group politics to explain changes in trade restrictions in China. Our model replaces the monetary contribution component of Freund and Özden’s (2008) with the political support from the politically sensitive groups in order to investigate if loss aversion can also explain the trade protection in a one-party dominated country such as China. We find that the producers of politically sensitive products receive more trade protection because the government cares more about their loss aversion. We also find that the trade distortions are higher (lower) when the world price is lower (higher) than the targeted domestic reference price. These predictions are shown to still hold when the model is extended to a large country case. We also empirically test the predictions of our model by using data from China's cotton sector.

As a final remark, although the current article focuses only on the producer side of the political sensitivity of Cotton, political sensitivity is not confined in only the producer side but also in the consumption side. The target of maintaining staple food prices stable also has notable effects on food trade policies. However, the political sensitivity of staple crops is out of the scope of our analysis because their production in China is not confined to certain political sensitivity regions. Future studies exploring the effect of the loss aversion of the producer and consumers of politically sensitive staple crops on trade protection should be valuable.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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