

## Food Safety and Trade Patterns: Case of Dairy in China

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### ABSTRACT

This study estimates the gravity model to show the effects of food safety (melamine) issue on dairy sector in China. Results indicate that melamine issue affected milk production, number of livestock, and dairy exports. However, ban on dairy products insignificantly affected exports, because ban was mostly imposed by countries who accounted for a meager share of China's dairy exports. Per capita economic size, common official language, common border and regional trade arrangements significantly positively affected dairy exports. Exports significantly decrease with increase in dairy production in importing country and if the trading partner is a land locked country.

**KEY WORDS:** dairy trade; food safety; gravity model

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### INTRODUCTION

Since its accession to World Trade Organization (WTO) and opening up, China has converted from a sleeping giant to a fastest growing economy of the World. The country is a major player in international trading system and an exporter of food products to number of countries, including United States, Canada, Africa, South and South East Asia and some of the European countries <sup>[1]</sup>. However, this performance met setbacks when a series of globally recognized food safety scandals<sup>1</sup> happened in China. <sup>[2, 3]</sup> declared melamine contamination in baby milk formula is the biggest food safety issue in China. The incident happened in the year 2008 and resulted in death of about six babies and more than 300,000 hospitalized. The scandal labeled a bad image to "Made in China" and 68 countries<sup>2</sup> banned entry of milk and milk products from China in their markets <sup>[4]</sup>. Resultantly, millions of farmers dependent on livestock for their livelihood affected <sup>[5]</sup>. The country incurred huge economic losses as demand for imported dairy products increased from US\$689.2 million in 2008 to US\$1.6 billion in 2010 <sup>[6]</sup>.

The issue of food safety has received immense attention of researchers. In this regard, <sup>[4]</sup> linked kidney injury among infants in China to melamine contaminated baby milk. They reported the severe effects of the event and stated that these effects will continue for a longer period. Consequently a remarkable increase in imports of milk and milk products occurred after the melamine issue <sup>[7]</sup>. <sup>[8-14]</sup> estimated gravity model and reported that nontariff barriers (especially stringent food safety standards) by developed economies affected agricultural exports from developing economies. <sup>[6]</sup> analysed the effects of food safety standards in China on imports of milk and milk products. They found no effect of food safety standards on imports of milk and milk products. Because in China, food safety standards are relatively lower than that in its major exporters. However, these stringent standards improved food safety standards in developed and developing economies <sup>[15, 16]</sup> as demand for high quality safe food is increasing. In this way, <sup>[17]</sup> pointed out a shift in government policy from food security to food safety in developing countries. <sup>[18]</sup> found that the Food and Drug Administration (FDA) refusal of imports mostly from developing countries is a sign of frequent occurrence of food safety issues. They put forward need for investment and more research to understand the problem and devise a reliable policy.

There is still a continuous debate among the researchers to estimate how food safety affects trade volume. The issue is more important in the context of developing and emerging economies like China as they are improving their safety standards to attract foreign consumers <sup>[6]</sup>. Review of previous work shows that researchers <sup>[9, 11-13, 17, 18]</sup> mainly

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<sup>1</sup> For details please check: Food Safety in China: Implications of Accession to the WTO. *China Perspectives* [Online], 2012/1 URL : <http://chinaperspectives.revues.org/5807> (accessed on March 27, 2014).

<sup>2</sup> List of countries is given by<sup>[4]</sup> includes: 1. Australia 2. Argentina 3. Bangladesh 4. Bhutan 5. Brunei 6. Burundi 7. Cameroon 8. Canada 9. Chile 10. Colombia 11. Dominican Republic 12. European Union member states (27) 13. Gabon 14. India 15. Indonesia 16. Ivory Coast 17. Japan 18. Laos 19. Macau SAR 20. Malaysia 21. Maldives 22. Mali 23. Myanmar 24. Nepal 25. New Zealand 26. Papua New Guinea 27. Paraguay 28. Peru 29. Philippines 30. Qatar 31. Russia 32. Singapore 33. South Korea 34. Sri Lanka 35. Suriname 36. Taiwan 37. Tanzania 38. Thailand 39. Togo 40. UAE 41. United States 42. Vietnam

focused on studying the issue in developed countries while only [6, 8, 13, 14] highlighted the trade aspect of food safety issues in developing countries. Of these, the [6] is the most recent one. They estimated gravity model to explain how food safety standards affected imports of dairy products in China. Their study mainly concentrated on imports and ignored exports of dairy products. The study also ignored other important variables like regional trade arrangements, distance, and country specific effects. Therefore, the current study attempts to fill the research gap and show the effect of melamine on dairy trade patterns of China using the workhorse gravity model.

### **Dairy Sector: Pre- and Post-Melamine Scenario**

The dairy sector in China received much attention in form of government support including allocation of land, development of grasslands, provision of economic incentives, introduction of high yielding livestock breeds (from Australia, Canada, Europe, New Zealand and United States), and adoption of improved livestock management practices [7, 19, 20]. Resultantly, cow milk production increased (from 13.00 to 36.58 million tones) as its number increased from 5.66 to 12.24 million during the period 2002 to 2011 (Table 1).

The rising income level, health awareness and government interventions to promote consumption of milk resulted in increased demand for milk. To meet the ever increasing milk demand, domestic milk supply was supplemented by imports. Therefore, import of dairy products increased from 272.23 to 2657.87 million US \$ during the period 2002 to 2011 (Table 1). In addition, the country also exported dairy products especially dry milk to Hong Kong, Macao and other Southeast Asian countries [7]. Export of dairy products increased from 193.92 to 498.65 million US\$ during the same period. However, melamine contamination in baby milk powder shook trust of consumers both in domestic and foreign countries and resultantly dairy industry incurred huge economic losses [2, 5, 20-22]. The incident not only affected milk production and number of livestock but also affected dairy imports and exports (Figure 1); cow milk decreased from 35.56 million tons in 2008 to 35.19 million tons in 2009 and its number reduced to 12.19 million head in 2009 from 12.34 million heads in 2008. Due to lack of trust in domestic dairy products and inelastic demand for baby formula milk, demand for foreign dairy products jumped from 872.78 million US\$ to 1046.35 million US\$ and reached 2657.87 million US\$ in 2011. Whereas exports of dairy products reduced to 340.32 million US\$ in 2009 from 621.01 million US\$ in 2008. The ratio of imports to exports show a sharp increase of 3.07 in 2009 from 1.41 in 2008 (Table 1).

The major importing and exporting countries and their respective shares in total imports and exports over a period starting from 2007 to 2012 are presented in Table 2. It is evident from the table that China imports of milk and cream (not concentrated nor containing added sugar) are mainly concentrated in New Zealand, Germany, France, and Australia. These four countries account for almost 90 percent of the total milk imports of China. New Zealand remained the top importer of with its share of 95.17 percent in 2008 to 37.50 percent in 2012. The reason may be because New Zealand and China entered a free trade agreement in 2008 to promote bilateral trade including dairy products. Resultantly, the tariff rates decreased to zero that promoted dairy imports<sup>3</sup>.

On the other hand, like imports, exports of milk and cream (not concentrated nor containing added sugar) are also concentrated mainly in Hong Kong, Mongolia, Macao, Philippines, Singapore, D.P.R. Korea, and Republic of Korea. Hong Kong is the major exporter where it share in total milk exports varies from 66.67 percent in 2008 to 99 percent in 2009. It is worth noting that before melamine incident of 2008, Hong Kong shared 79.31 and 66.67 percent of total milk exports respectively during the year 2007 and 2008. Hong Kong accounted for above 90 percent after the melamine crisis as most of the countries imposed ban on entry of milk and milk products to their market or devised stringent regulations to safeguard the health of consumers and environment.

In a nut shell the event badly damaged the label “made in China”, trust of domestic consumers and trade partners lost. This caused loss to consumer in terms of health and buying costly imported items and loss to government as exports declined and imports increased. Learning from this largest food safety incident of China’s history, the government revisited its food safety policy. The government also changed the policy of supporting the dairy industry and gave more emphasis on strengthening the regulatory framework and quality control [7]. Resultantly, in 2009 the government promulgated the Food Safety Law and in 2013 established a ministry level agency-China Food and Drug Administration to merge authorities in food and drug safety.

<sup>3</sup> <http://images.mofcom.gov.cn/gjs/accessory/200804/1208159044606.pdf> (accessed on January 7, 2015)

**Table 1. China's Dairy Sector: Pre- and Post-Melamine Scenario**

Year	Livestock Head* (million)		Milk Production* (million tonnes)		Dairy Products Trade Value# (million US\$)		
	Cow	Buffalo	Cow	Buffalo	Imports	Exports	Imports/Exports
2002	5.66	5.31	13.00	2.70	272.23	193.92	1.40
2003	6.87	6.44	17.46	2.75	349.83	221.55	1.58
2004	8.93	5.21	22.61	3.52	448.07	234.21	1.91
2005	11.08	5.37	27.53	2.80	461.78	267.37	1.73
2006	12.28	5.40	31.93	2.85	565.24	301.99	1.87
2007	12.59	5.45	35.25	2.90	752.94	461.42	1.63
2008	12.34	5.46	35.56	2.95	872.78	621.01	1.41
2009	12.19	5.48	35.19	3.00	1046.35	340.32	3.07
2010	12.36	5.71	35.70	3.10	2000.01	404.55	4.94
2011	12.24	5.71	36.58	3.10	2657.87	498.65	5.33

\*FAO Statistics #UN Comtrade data



**Table 2. Major Exporters and Importers of China's Milk and Cream**

Rank	2007	2008	2009	2010	2011	2012
Importers						
1	New Zealand (56.72)	New Zealand (59.17)	New Zealand (50.00)	New Zealand (57.14)	New Zealand (55.00)	New Zealand (37.50)
2	France (22.39)	France (19.17)	France (18.00)	France (23.93)	Germany (18.33)	Germany (25.00)
3	Australia (6.68)	Australia (11.67)	Australia (7.50)	Germany (11.07)	France (15.17)	France (14.17)
4	Germany (5.73)	Germany (5.81)	Germany (7.50)	Australia (5.00)	Australia (8.33)	Australia (12.50)
Exporters						
1	Hong Kong (79.31)	Hong Kong (66.67)	Hong Kong (99.00)	Hong Kong (93.75)	Hong Kong (90.48)	Hong Kong (93.98)
2	Singapore (6.55)	Philippines (6.67)	Macao (0.98)	Rep. of Korea (3.54)	Rep. of Korea (8.10)	Mongolia (2.97)
3	D.P.R. Korea (4.48)	Mongolia (5.67)	France (0.01)	Macao (0.85)	Macao (0.95)	Singapore (1.63)
4	Macao (4.14)	Singapore (5.67)	--	D. P. R. Korea (0.48)	Singapore (0.21)	Macao (1.44)

Figures in parentheses are the respective percent shares in total  
 Derived from Comtrade data

## MATERIALS AND METHODS

### Empirical Model:<sup>4</sup>

Since long the gravity model is being used to identify the bond linking trade volume with the “weight” (economic weight) of different countries and its distances. Despite its wide application, a solid economic foundation

<sup>4</sup> Most of the discussion in this section is based on Bergeijk and Brakman (2010).

was missing to support gravity equation. [23] provided a sensible micro-economic foundation by fitting gravity model into optimizing framework. [24] broadening the scope of [23], presented a technique to handle the price (index) terms. After backing up the gravity equation with theoretical foundation, attention being paid to the structural shortcomings of gravity equation selection bias and heteroskedasticity [24-26]. Presently, the contribution of [24] works as a reference for others working on gravity equation.

The impact of conflict on trade got attention from the work of [27, 28] who accounted corruption, unsatisfactory implementation of contract, terrorism and insecurity as a hidden tax to constrain bilateral trade flows. However, the focus of this work is to get insight into the dairy trade patterns of China. Therefore, this study used the following model by incorporating food safety issue (Melamine contamination) in China and resultant ban imposed by different countries on Chinese dairy products.

$$T_{ei} = \beta_0 + \beta_1 FS + \beta_2 ban + \beta_3 Z + \varepsilon \quad (1)$$

Where  $T_{ei}$  is bilateral trade flow,  $FS$  is dummy for food safety and equals 1 for the post-melamine period (2009, 2010, 2011, and 2012) and zero for the pre-melamine period (2007 and 2008).  $Ban$  is a dummy equals 1 for countries who imposed ban on China's dairy exports and zero otherwise.  $Z$  is a vector of variables from gravity equation,  $\varepsilon$  is the error term and  $\beta_s$  are the parameters to be estimated. Trade flow between two countries ( $T_{ei}$ ) is negatively affected by the distance ( $Dis_{ei}$ ) between country  $e$ , and country  $i$  the tariff ( $Tar_i$ ) levied to tax the entry of the product and if one or both of the trading partners are landlocked ( $LL_d$ ). In addition, other factors like per capita economic sizes ( $\frac{Y_e Y_i}{Pop_e Pop_i}$ ), common language ( $Lan_d$ ), border ( $B_d$ ), and regional trade agreement ( $RTA_d$ ) promote trade between the trading partners.

$$\ln T_{ei} = \beta_0 + \beta_1 FS + \beta_2 ban + \beta_3 \ln Dis_{ei} + \beta_4 \ln \left( \frac{Y_e Y_i}{Pop_e Pop_i} \right) + \beta_5 \ln Mlk_i + \beta_6 Tar_i + \beta_7 LL_d + \beta_8 Lan_d + \beta_9 B_d + \beta_{10} RTA_d + \varepsilon \quad (2)$$

## Data

The study used data for the period 2007-2012 to show the effect of melamine incident on China's dairy trade. Data on bilateral dairy trade<sup>5</sup> volume (US \$ 000) were derived from the United Nation, Commodity Trade Statistics (UN COMTRADE) database<sup>6</sup>. Data on milk production were obtained from FAOSTAT. Data on population (number 000) and Gross Domestic Product (US\$ 000) were derived from the World Bank database. Data on distance (000 kilometer) between the capitals of reporting and partner countries, landlocked countries, language, and border were acquired from CEPII database<sup>7</sup>. Data on tariff were compiled from TRAINS<sup>8</sup> data base. In order to show the role of trade agreements in trade flow, data on trade agreements signed by China with different trading partners were collected from the World Trade Organization (WTO) website. In response to melamine incident various countries imposed ban on entry of dairy products from China into their market, to capture its effect on dairy imports list of the countries were acquired from [4].

## RESULTS

Fixed effects models are estimated to study the effect of melamine incident on imports and exports of milk and dairy products and birds egg. Variables like political structure of a country, business cycle etc. are specific to a country and vary across countries. Fixed-effects (FE) models are used to estimate the impact of variables that vary over time as it remove the effect of time-invariant characteristics.

The estimated results for import of milk and cream, and milk products other than butter or cheese are presented in table 3 (column II). Results of the estimated model depict that model fits data well as  $R^2$  value 0.85. F-statistic is 287.4 showing that model is statistically significant at 99 percent and rejects the hypothesis that all the coefficients of the regression models except the intercept are zero. The country and year fixed effects are included in the model to account for multilateral resistance terms and to control for other omitted country and year-specific factors. These fixed effects are tested with the null hypothesis that their joint effects are zero. Country and year-specific fixed effects (F-statistic) are statistically significant at 99 percent level of significance. These results imply that estimating the models without these fixed effects would have produced biased estimates.

<sup>5</sup> SITC Revision 4-02 Dairy products and birds' eggs and SITC Revision 4-022 Milk and cream and milk products other than butter or cheese

<sup>6</sup> <http://comtrade.un.org>

<sup>7</sup> CEPII is a French research center in international economics (Centre d'Etudes Prospectives et d'Informations Internationales) [http://www.cepii.fr/CEPII/en/bdd\\_modele/download.asp?id=8](http://www.cepii.fr/CEPII/en/bdd_modele/download.asp?id=8)

<sup>8</sup> <http://www.unctad.info/en/Trade-Analysis-Branch/Data-And-Statistics/TRAINSWITS/>

Results (Table 3, Column II) show that coefficients carry signs according to our prior expectations except distance. This may be because China major portion of milk imports are from countries located very far compared to other trading partners of China. It is also worth mentioning that the melamine contamination in the baby milk formula and subsequent ban by the importing countries have insignificant effects on milk imports of China. Keeping other variables constant, one percent increase in per capita income of both the trading partners significantly increases imports by 0.109 percent. On the same line imports increase by 2.279 percent if tariff rate is reduced by one percent. If the trading partner is a landlocked country then imports decrease by 3.571 percent. Imports increase by 2.896 percent if the trading partners share the same official language.

The estimated results for exports of milk and cream, and milk products other than butter or cheese are presented in Table 3 (Column III). Goodness of fit value ( $R^2$ ) shows that 71% variation in dependent variable has been explained by independent variables i.e., the model fits the data well. F-statistic is 35.07 showing that the model is overall significant and rejects the hypothesis that all the coefficients of the regression models except the intercept are zero. The country and year fixed effects are incorporated in the model to control for omitted country and year specific factors. These fixed effects account for multilateral resistance term. The calculated F-statistics for these fixed effects are highly significant and rejects the hypothesis that their joint effects are zero.

The results (Table 3, Column III) further delineate a significant decrease of 3.529 percent in exports of milk with the melamine incident. However, ban on exports has an insignificant effect on exports of milk. Milk exports significantly reduce by 0.749 percent with a percent increase in milk production in importing countries. If the importing country is landlocked exports reduce by 6.776 percent. However, exports increase by 2.463 percent if the trading countries share the common border. The regional trade agreements positively affect export of milk and cream; export increases significantly by 1.435 percent if the trading partner is signatory of a regional trade agreements with China. Distance, tariff, and common official language insignificantly affect export of milk and cream.

Results of import of dairy products and birds egg (Table 3, Column IV) show that model fits data well as  $R^2$  value is 0.88. F-statistic is 394.2 showing that model is overall statistically significant at 99 percent and rejects the hypothesis that all the coefficients of the regression models except the intercept are zero. The country and year fixed effects are included in the model to account for multilateral resistance terms and to control for other omitted country and year-specific factors. The value of F-statistic for country and year fixed effects are highly significant and rejects the hypothesis that the joint effects are zero.

The coefficients of model (Table 3, Column IV) have signs according to economic theory except distance and border. As mentioned earlier in the case of milk imports, this may be because China major importer for dairy products are geographically located very far. Like milk imports, melamine contamination and the subsequent ban has insignificant effect on overall dairy products. Imports of dairy products increase by 8.89 percent if the trading partner share a common border with China. Imports of dairy products increase by 1.29 percent if the trading partner is signatory of a trade agreement with China, Per capita GDP, milk production, tariff, and landlocked country variables insignificantly affect import of dairy products and birds egg.

Results of export of dairy products and birds egg are presented in Table 3 (column V). The value of goodness of fit ( $R^2$ ) shows that 74% variation in dependent variable has been explained by independent variables and the model fits the data well. F-statistic is 63.02 showing that model is overall significant at 99 percent and rejects the hypothesis that all the coefficients of the regression models except the intercept are zero. The country and year fixed effects are included in the model to account for multilateral resistance terms and to control for other omitted country and year-specific factors. The value of F-statistics for country and year fixed effects are highly significant and rejects the hypothesis that joint effects are zero.

Results of model for exports of dairy products and birds egg (Table 3, Column IV) show a significant decrease of 2.52 percent with the occurrence of melamine incident and ban has an insignificant effect. The per capita economic sizes of both the country has a significant positive effect of 0.088 percent. A one percent increase in dairy and birds egg production in the importing countries negatively affect exports of from China by 0.65 percent, Relaxing tariff rate by one percent increase dairy products exports by 1.17 percent. Exports of dairy products decrease by 5.19 percent if the trading partner is landlocked if the trading partner is landlocked. The common official language affects exports positively i.e., exports increases significantly by 2.09 percent between China and countries where Chinese language is spoken. Border and distance insignificantly affect exports of dairy products and birds egg.

## DISCUSSION

Results of the estimated models depict that models fit the data well as  $R^2$  value is ranging from 0.71 to 0.88. The estimated models are also statistically significant; rejecting hypotheses that coefficients of regression models

except intercept are zero on the basis of F-statistics. To account for omitted country and year specific factors, country and year fixed effects are included in the models. Hence, estimating models without these fixed effects produce biased estimates. These fixed effects are tested with the null hypothesis that the joint effects countries and year are zero. All the fixed effects are statistically significant for all the models.

Prior expectations are that occurrence of food safety issues and subsequent ban by the importing countries cut export of a country and may increase imports of that country for the affected product. The per capita income has a positive impact on trade. Trade volume is low between distant countries and if the trading partner is landlocked. Similarly, in the presence of regional trade arrangements, trade volume between the partner countries increases, common language and common border between the countries increases volume of trade. Estimated results show that coefficients of all these variables have expected signs except distance (column II and IV) and border (column IV) and significant at various level of significance (Table 3).

Table 3. Fixed Effect Estimates of Gravity Model

I	II	III	IV	V
Variables	Import <sup>#</sup>	Export <sup>#</sup>	Import <sup>##</sup>	Export <sup>##</sup>
Food Safety	0.173 (0.64)	-3.529*** (0.35)	0.430 (0.59)	-2.522*** (0.33)
Ban	0.829 (0.72)	0.602 (0.51)	0.931 (0.65)	0.810 (0.45)
Log of per capita economic sizes	0.109** (0.036)	0.0461* (0.020)	0.0436 (0.039)	0.0882*** (0.026)
Log of distance	3.999*** (0.97)	0.642 (0.70)	1.588*** (0.46)	-0.790 (0.43)
Log of milk production (partner)	0.370 (0.38)	-0.749** (0.25)	0.167 (0.35)	-0.625** (0.24)
Log of tariff	-2.279*** (0.47)	-0.684 (0.39)	1.241 (0.73)	-1.168** (0.36)
Land Locked	-3.571** (1.29)	-6.776*** (0.91)	-1.443 (2.16)	-5.194*** (0.81)
Language (official)	2.896** (0.96)	1.607 (1.18)	8.888** (3.00)	2.091* (0.97)
Border	0.898 (2.02)	2.463* (1.19)	-4.417*** (1.19)	0.245 (1.13)
RTA	1.167 (0.69)	1.435* (0.59)	1.288* (0.52)	2.153*** (0.45)
Constant	-2.006* (0.87)	12.81*** (2.78)	-0.738 (0.87)	14.56*** (2.87)
<b>Fixed Effect (F-statistics):</b>				
Country	118.60***	10.93***	269.26***	20.69***
Year	145.20***	2.59*	129.00***	18.7***
N	336	624	390	726
R <sup>2</sup>	0.852	0.708	0.880	0.737
F	287.4	35.07	394.2	63.02

<sup>#</sup> Milk and Cream and Milk Products other than Butter or Cheese and <sup>##</sup>Dairy Products and Birds' Eggs

Standard errors in parentheses

\* p<0.05, \*\* p<0.01 and \*\*\* p<0.001

Results for imports of milk and cream, and milk products other than butter or cheese (Table 3, Column I) and dairy products and birds egg (Table 3, Column III) that food safety (melamine) issue in the reporting country (China) has increased volume of imports in both cases (Table 3, Column II and IV) but its affect are statistically non-significant. Accordance to <sup>[29-31]</sup> imports increase with the occurrence of food safety issues, as consumers loss its confidence in domestic products and trust more the imported products. Therefore, increase in imports is because of lack of confidence of consumers in domestic dairy products due to food safety issue. However, as reported earlier in section 1.2 that imports of dairy products increased. Based on the results of estimated models it is confirmed that this increase may be contributed to other than melamine issue like government interventions to promote consumption of milk, rising income level, and growing health awareness.

Results also describe that increase in per capita income positively affect imports of milk and cream. It delineates that with the rising income level demand for imported products has increased. <sup>[6]</sup> found opening up border for imported products, one of the reasons for increase in imports. Similar affect has been observed in our case, RTA has increased the volume of imports but its affect is insignificant for milk and cream, and milk products other than butter or cheese and significant for dairy products and birds egg.

Distance between china and its trading partners has a positive sign, opposite to prior expectations. As China imports about 90 percent of both milk and cream and dairy products and birds egg from New Zealand, Australia, France, and Germany (Table 2). These country are situated very far compared to other trading partners of China. Similar results have been observed for sharing common border in case of imports of dairy products and birds egg.

Results of the estimated models for dairy exports are presented in Table 3 (Column III and V). The results describe that food safety (melamine) issue tagged bad name to China dairy products in international markets and dairy exports significantly decreased due to health and environmental concern of importing countries. Our findings are on same line with the findings of [13, 32, 33], that food safety issues hinder trade especially exports from developing countries and high cost of observing the strict safety regulations. As mentioned earlier, with the melamine incident, consumers both in domestic and foreign countries lost trust in China's dairy products that affected not only the exports but the country suffered from decrease in milk production and number of livestock.. Resultantly dairy industry incurred huge economic losses [3, 5, 21, 22, 34]. The resultant ban on the dairy exports from China is non-significant. This may be due to the fact that ban were mostly imposed by the countries who account for a meager share of China's dairy exports. However, common language significantly and positively affected dairy exports.

### CONCLUSION

The study used trade data for the period 2007-2012 to show the effect of melamine incident on China's dairy trade. Study found that melamine contamination not only affected milk production and number of livestock but also affected the dairy imports and exports. Imports of dairy products increased due to lack of trust of consumers in domestic dairy products and increase in per capita income. While China dairy exports significantly decreased due to health concern of importing countries. Ban had a non-significant impact on dairy exports and imports of China. This may be due to the fact that ban was mostly imposed by the countries who accounted for a meager share of China's dairy exports. However, per capita economic size, common official language, common border and regional trade arrangements significantly positively affected dairy exports. Exports significantly decrease with increase in dairy production in importing country and if the trading partner is a land locked country.

This study concerned only to dairy trade, a similar study for other food products may also be carried out to show the link between food safety and trade patterns. Likewise, presented by [6], a comprehensive study is needed using computable general equilibrium (CGE) models to take care of the all the aspects of economy in order to portray a clear image of food safety issues on trade patterns. Based on the findings of the study, it is a high time to revisit the food safety policy and devise policy on the same lines that of developed countries to control future losses in exports of dairy products. Keeping in view the response of per capita economic size especially to imports, the government should take steps to increase production of dairy products in order to meet its increasing import demand.

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