Research Article

Mandarin Exports from Pakistan and its Macroeconomic Determinants

Shumaila Nazir[1], Iqbal Javed[1], Muhammad Luqman[2*] and Azra[3]

[1]Department of Economics, University of Lahore, Sargodha Campus, Sargodha, Pakistan; [2]Department of Agricultural Extension, College of Agriculture, University of Sargodha, Pakistan; [3]Department of Economics, Kohat University of Science and Technology, Kohat, Khyber Pakhtunkhwa, Pakistan.

Abstract | The study was conducted to estimate the macroeconomic determinants of Mandarin (Kinnow) export from Pakistan. In this study, the dynamic panel data of 29 importing countries for the period of 2005 to 2018 was estimated by GMM (Generalized Method of Moment) model. The variables of total exports of Kinnow, domestic prices, population of importing countries, domestic exchange rate, exchange rate of importing countries, domestic production, and distance between trading partners were used to estimate the model. Data were collected from the international trade center, Federal Bureau of Statistics; Islamabad, Pakistan Economic Survey, and International Financial Statistics. Domestic prices of Kinnow were obtained from Pakistan Statistical Yearbook. Exchange rate data was taken from the State Bank of Pakistan. The results of system GMM (Generalized Method of Moment) shows that domestic prices, domestic exchange rate, distance were significant and negatively influenced on both equations; while, the population and exchange rate of importing countries, and domestic production has a positive and significant effect. It is suggested that Pakistan should concentrate more on economies with a large population as a Kinnow commodity importing nation. Stable exchange rates include the involvement of strong government pricing policies to make Mandarin more competitive on world markets. The issue of Pakistan's low export-to-production ratio needs to be addressed. It is proposed that Pakistan seek to improve the environment of exports with countries close to Pakistan and its neighbors. Policymakers should address the problems of Kinnow export and formulate policies.

Received | October 15, 2021; **Accepted** | November 05, 2021; **Published** | February 25, 2022
***Correspondence** | Muhammad Luqman, Department of Economics, University of Lahore, Sargodha Campus, Sargodha, Pakistan; **Email:** muhammad.luqman@uos.edu.pk
Citation | Nazir, S., I. Javed, M. Luqman and Azra. 2022. Mandarin exports from Pakistan and its macroeconomic determinants. *Sarhad Journal of Agriculture,* 38(2): 563-571.
DOI | https://dx.doi.org/10.17582/journal.sja/2022/38.2.563.571
Keywords | Exports performance, Determinants, Macroeconomic factors, Mandarin, Pakistan

Introduction

The agriculture sector plays a major role in Pakistan's economy, accounting for 18.74% of GDP and providing 38.5% of employment (GoP, 2019). There are four sub-sectors in the agricultural sector, including crops, livestock, fisheries, and forestry. Pakistan's main agricultural exports include raw cotton, cotton yarn, fruit, fish, fish preparation, vegetable, rice, wheat, oilseed and sugar. In the farming sector, fruit production plays a vital role in Pakistan's economy and other crops (vegetable fruits and fodder) have share 2.1 percent of GDP (GoP, 2019). Nature has blessed Pakistan with the best ecological environment for growing large varieties of vegetables and fruits. Given Pakistan's natural topography, there is an increasing importance of the country's horticultural activities (Naseer *et al.*, 2016; Raza *et al.*, 2012). Among countries of the world, there are few countries that grow fruit in special cool climatic conditions (apple, cherries, plumps, pears), warm climatic condition (grapes, melon, apricots, pomegranates) and climatic

condition (banana, citrus, dates, guava and mango). Pakistan's climatic and soil condition provide a delicious flavor to other cultivars in the world (Khan *et al.*, 2011).

Citrus fruits stand at the top position in area, production and exports of fruits in Pakistan (Ghafoor, *et al.*, 2008). As citrus fruit production is half of the total fruit production in Pakistan and among the citrus Kinnow is the product which is largely produced. As Pakistan is the 5th largest Kinnow exporter beside other fruits. So this study is planned to compute the Pakistani Kinnow export and its competitiveness. Total production of fruit is 5,685 thousand tons and total citrus production is 2180 thousand tons (GoP, 2018; TDAP, 2018). In total fruit exported 50 percent share of citrus. The share of dates dried and mangoes is 28 and 10%, respectively. In 2018 citrus exported quantity is 440 thousand tons included mandarin, oranges, lemons, grapefruits etc. Pakistan's Kinnow belongs to Mandarin family. Kinnow has a predominate share in citrus followed by oranges and lemon. The share of Kinnow, Fresh in citrus exported is 353 thousand tons having 96% share of citrus. Share of Oranges is 2%. The share of lemon and grapes fruit is 1.5 and 0.5% respectively. Kinnow is the exportable commodity which constitutes about 7% of world export HS Code: 080520 of Mandarin/Tangerine. Pakistan holds a prominent position among top five Kinnow (mandarin) exporting countries in the world (FAO, 2019). Pakistan exports of fresh Kinnow in 2018 is 219 thousand tons that is less than that of 2015-16 it was 353 thousand tons. Pakistan Kinnow fresh export declined last year.

Pakistan's Kinnow, fresh export value for the year 2018 is around USD 90155 thousand. Afghanistan, Russian Federation, United Arab Emirates, Philippines, Indonesia, Saudi Arabia, Ukraine, Sri Lanka, Kuwait and Oman are the top importer of Pakistani Kinnow, Fresh (ITC, 2018) as shown in Figure 1. Pakistan export Kinnow 33.3% to Afghanistan, 31.1 percent to Russian Federation and 11.3% to United Arab Emirates, Philippines, Indonesia, and Saudi Arabia as 5.8, 5.6 and 3.1% respectively (ITC, 2018). The aim of this paper to review the performance of Pakistani Kinnow (mandarin) to international markets and to estimate the impact of different factors on Kinnow exports from Pakistan.

The world competitors of Pakistani Kinnow fresh are Spain, Turkey, China and Morocco in the world market. Pakistani citrus has unique taste and juice. Taste and juice of Pakistani Kinnow attracts the consumers all over the world.World largest exporter of Product HS code 080520, Fresh mandarins' incl. tangerines and similar citrus is Spain (ITC, 2018; FAO, 2018). In 2018 exported quantity is 1464 thousand tons. The share in world export is 29 percent while Turkey, China and Morocco having share 14, 13, 10% respectively. Pakistan stands at the 5th major mandarin/ Tangerine exporter in the world. Pakistan's exported share in the world is 7% (ITC, 2018). Pakistan is facing highly competition from Spain, Turkey, China and Morocco.

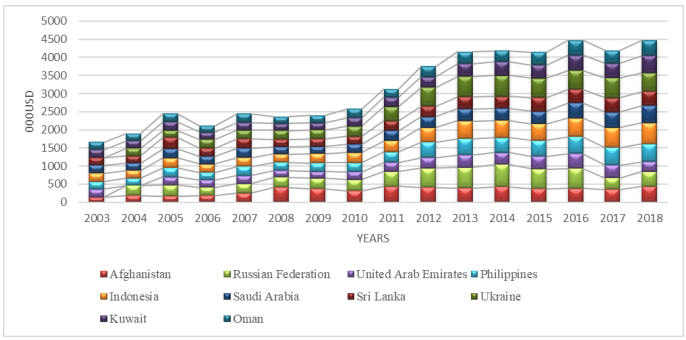

Figure 1: *Exports of kinnow (mandarin) from Pakistan to major markets.*
Source: *ITC, 2018*

Ahmad *et al.* (2018) analyzed assessment of the value chain and analysis of citrus fruit export determinants in Pakistan based on the primary data. The citrus export sector was found to be dominated by large well-established exporters whose profitability was focused on a high-volume and low-margin market, recommended that improving the product quality to improve the Pakistan Kinnow exports. Akhtar *et al.* (2009) Studied on world market competitiveness of Pakistani fruits. Methodology was used RCA to measure competitiveness and also analyzed domestic consumption trends by employing RCA (revealed comparative advantage). It also examined patterns in domestic consumption of particular fruits cultivated by largest exporters. The findings suggested that in fruit export Pakistan had a comparative advantage and also analyzed that comparatively Pakistan had a highly competitive and comparative advantage in production of mango and dates production. The values of Pakistan fruit's RCA had an increasing trend which revealed that there was greater growth potential. Fruits exports were source of foreign reserves. Nazeer *et al.* (2019) conducted a research study to find the margin and determinants of Kinnow exports from by using primary data. Haleem *et al.* (2005) analyzed

role of the citrus fruit export supply in Pakistan. Since 1975 the aim of this study was to evaluate the export performance of citrus fruit. The findings showed that fruits exports was decreasing trend resulting less foreign earnings. Results also defined the importance of price and non-price determinants in describing the supply function of citrus. Overall results indicated that domestic production (internal factor) played greater role than external factors in clarifying fluctuation in citrus exports. Ghafoor *et al*. (2010) analyzed the determinants of mango export from Pakistan. The aim of the study was to estimate the effect of certain variables that affect Pakistan's mango export. The findings revealed that mango exporter's education, mango exporter's experience, average purchasing price, average marketing cost and average sale price of mango significantly affect exports of mango. Javed *et al*. (2016) examined the factors affecting the bilateral trade of Pakistan with UAE and used panel data set in the gravity model. According to Fatima *et al*. (2019), Pakistan's exports are mostly agricultural based and Pakistan should improve its trade relations with those countries which joint border and cultural similarities.

After reviewing the literature on export of Kinnow, it was revealed that relevant research work on Kinnow export was based on primary data. However, there is need of a study based on analysis of factors affecting the Kinnow export by using secondary data. The present study was planned to analyze the impact of major variables on Kinnow export from Pakistan to its major trading partners. The study of mandarin exports from Pakistan and its macroeconomic determinants are necessary on Pakistan's point of view as 5th largest exporter of fresh Kinnow in the world. Further, it is necessary to study the determinants of Kinnow export to make proper policies to increase Kino exports from Pakistan.

Materials and Methods

In this study, the dynamic panel data of 29 importing countries for the period of 2005 to 2018 was estimated by GMM (Generalized Method of Moment) model. The dependent variable used in the study is the value of Kinnow export from Pakistan to trading partner. Independent macroeconomics variables used in the study are domestic prices,population of importing countries, exchange rate of importing countries; domestic production and distance between trading partners were the estimated determinants. Data were collected from ITC (international trade center), PFBS (Federal Bureau of Statistics) Islamabad Pakistan, Pakistan Economic Survey, International Financial Statistics and IMF (International Monetary Fund). Domestic prices of Kinnow, Fresh were taken from Pakistan statistical year book. Exchange rate data was taken from stat bank of Pakistan.

The analysis was done by using pooled OLS, fixed effect, random effect. Analysis specification was favor of fixed effect, while the results were negative and insignificants. There was a problem of endogeneity and serial correlation among determinants. GMM (Generalized Method of Moment) model was used to handle out these problems.

Testing panel unit root

Four test for checking the unit root (Levin Lin & Chu, I P Shin W-stat, ADF — Fisher Chi-square and PP — Fisher Chi-square) If the hypothesis of a unit root or non-stationary not reject at level, then data turn to first difference to test the stationarity and so on. The data transfer to the next difference, until the stationarity hypothesis accepted.

Appropriate model selection for panel analysis

Which model is most suitable when estimate panel data: the model with FE (fixed effect) or the model with RE (random effect)? Most economists used the following criteria to decide which model is most appropriate for.

When the error terms (unit dependent unobserved effect) with correlate one or more explanatory variables. Than fixed effect model will suitable model for panel data analysis. If the error terms (unit dependent unobserved effect) will not correlated explanatory variables, than random effect model will be more appropriate. When this assumption will violated, than the estimates by random effects estimators will biased and inconsistent, while biased and consistent estimate will be yielded fixed effect estimator. In order to cope with fixed effect problem the system GMM (Generalized Method of Moment) was used.

GMM (Generalized Method of Moment) model

The analysis was done by using pooled OLS, fixed effect, random effect. Analysis specification was favor of fixed effect, while the results were negative and insignificants. There was a problem of endogeneity and serial correlation among determinants. GMM

(Generalized Method of Moment) model was used to handle out these problems (Bekele and Fekadu, 2019; Nguyen, 2010; Yishak, 2009) estimated GMM (Generalized Method of Moment) to remove the endogeneity problem. As micro panel data under discussion faces the endogeneity problem while GMM model is appropriate model to overcome all the problems faces by micro panel data like, auto-correlation, heteroscedasticity and serial correlation. So GMM model was applied in this study.

$$log(Kijt) = \beta_0 + \beta_1 log(Kij_{t-1}) + \beta_2 log(Price_{jt}) + \beta_3 log(POP_{jt}) + \beta_4 log(EXCH_{jt}) + \beta_5 log(Production_{it}) + \beta_6 log(Distance_{ijt}) + U_{ijt} \quad \ldots\ldots\ldots\ldots\ldots (1)$$

Where;
Kijt denotes the value of Kinnow export from country i (Domestic market) to country j (importing countries) in t year, $Kij_{(t-1)}$ in system GMM model equation 1 shows the quantity of Kinnow export i country to j country in year t-1.

The 1st lag of Kinnow export can be viewed as the proxy variable a parts of misplaced variables, and it can reflect the self-inertia and lasting effect of Kinnow export. Kinnow export's 1st lagged make the model a dynamic panel model too. i = Domestic market; j = kinnow importing country from Pakistan; K_{ijt} = Pakistani Kinnow export(USD per ton) from country i to country j in year t; $Price_{jt}$ = Kinnow prices(USD per ton) of country j in year t; Pop_{jt} = population(Million) j country in t year; Exchjt = exchange rate(US $) of country j in year t; $Production_{it}$ = domestic Kinnow production in year t; $Distance_{ijt}$ = distance(KM) between country i to country j in year t; U_{ijt} = error term, t time period.

GMM model have two main specification tests which are serial correlation and sargan test.
Serial Correlation: To check the second order Serial Correlation in the Residuals. AR(1) and AR(2) Both >5 Meaning that there is no serial correlation Accept the null hypothesis.

Sargan Test: Actually, efficiency of GMM modal depend on reliability and Validity of the Instruments so one hypothesis OR Rule of thumb of GMM modal is that instrumental variables are greater than the no. of estimated Coefficients. Sargan Test: @ chisq (Prob ((J-statistic), Instrument rank-estimated coefficient's)).Sargan test= p>5 meaning that the instrumental variables are reliable. Prob. (J-statistic) >5 meaning that there is no endogeneity problem exist in the modal.

Results and Discussion

Pakistan currently exports just 10 per cent of its total output of Kinnow. The value of in 2019 Pakistan export Kinnow, worth US$ 158 million (ITC, 2019), with Philippines, Oman, Mauritius, Indonesia, Azerbaijan and Afghanistan being the main foreign markets (Memon, 2017). Pakistan exports of fresh Kinnow in 2018 was 219 thousand tons while in 2015-16 it was 353 thousand tons. Pakistan Kinnow fresh export declined last year.

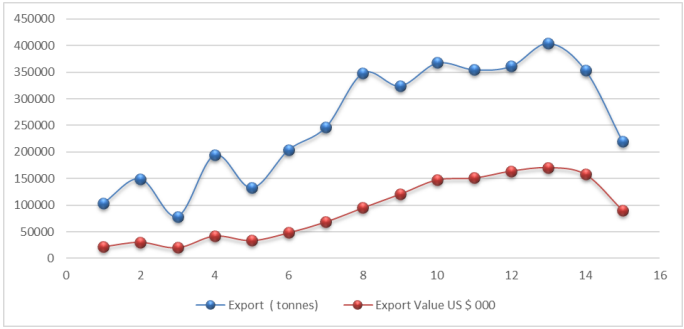

Figure 2: *Kinnow export from Pakistan and its exported Value.*
Source: *ITC, 2018.*

Pakistan Kinnow export was increased from 2003 and 2004, while, it decreased in 2005 and 2007. After 2007, Kinnow exports as well as export value increased gradually. There is short decline was noted 2011. However, after 2016, large scale decline in Kinnow export in 2018 was noted as shown in Figure 2. Export earnings from Fresh Kinnow also registered a decline in value and quantity. This indicates that despite rising prices, enable to capture the demand of this item due to foreign competition along with increasing transport costs.

The macroeconomic variables include total exports of Kinnow, domestic prices, prices of importing countries, population of importing countries, domestic exchange rate, exchange rate of importing countries, domestic production and distance between trading partners were the estimated determinants. The descriptive summary data in Table 1 shows that Pakistan's average exchange rate value was US$ 80.27 and Pakistan's average importing partner exchange rate value was US$ 1498.63. The mean partner population is 46.98 million. The mean distance between Pakistan and its top importing countries is 1358 km.

Table 1: *Summery statistics.*

Variable	N	Minimum	Maximum	Mean	Std. Deviation	Proba-bility
$D\_price_{it(USD\ per\ ton)}$	406	104.52	297.69	215.98	63.27	0.0000
$Price\_j_{jt(USD\ per\ ton)}$	406	100.00	3700.00	410.46	407.73	0.0000
$Exch\_i_{it(US\ \$)}$	406	57.75	104.76	80.27	18.016	0.0000
$Exch\_j_{jt(US\ \$)}$	406	0.26	30914.85	1498.63	4756.85	0.0000
$POP\_J_{Jt(Million)}$	406	0.085	258.16	46.98	60.21	0.0000
$D\_production_{it}(_{USD\ per\ ton})$	406	1472.000	2458.00	2113.72	259.08	0.0000
$DIS\_{}_{ijt(km)}$	406	278.50	13.8295	1358.049	214.56	0.0000

Source: *author's calculation*

Table 2: *Results of the panel unit methods.*

Variables	Data Type	Test Statistics/ Probability	Levin, Lin & Chu t*	Im, Pesaran & Shin W-stat	ADF - Fisher Chi-square	PP - Fisher Chi-square
EXCHj	Level data	Test Statistics	0.79125	2.68143	29.9687	34.4506
		Probability	0.7856	0.9963	0.9817	0.9292
	1st Difference	Test Statistics	-4.91327	-2.19379	75.8270	105.473
		Probability	0.0000	0.0141	0.0064	0.0000
Price_j	Level data	Test Statistics	2.38039	4.79502	17.2359	22.9888
		Probability	0.9914	1.0000	1.000	0.9988
	1st Difference	Test Statistics	-4.97842	-4.07242	98.2555	242.377
		Probability	0.0000	0.0000	0.0001	0.0000
POPj	Level data	Test Statistics	-16.6115	-11.6919	204.344	88.1753
		Probability	0.0000	0.0000	0.0000	0.0065
Domestic production	Level data	Test Statistic	-8.75935	-5.04067	114.518	313.493
		Probability	0.0000	0.0000	0.0000	0.0000

Source: *Author's calculations.*

Table 3: *Multicollinearity.*

Variables	VIF
$L(Price\_j_{jt})$	1.36
$L(Pop\_J_{jt})$	1.48
$L(Exch\_J_{jt})$	1.46
$L(D\_Production_{it})$	1.48
$L(Distance_{ijt})$	1.28

Source: *author's calculation*

Four test for checking the unit root (Levin Lin & Chu, I P Shin W-stat, ADF — Fisher Chi-square and PP — Fisher Chi-square) used. Some variables were stationary and some variables were non-stationary, it was not issue in micro panel data. In the stationary of dependent and independent variables, the unit root tests are not used, since the time duration is small. Therefore, the non-stationarity issue is not a concern (Blackburne and Frank,2007) as shown in Table 2.

VIF value for all the variable which has showed in Table 3 is less than 10 so there is no problem of multicollinearity exist in the data. The Current study was conducted to review the performance of Pakistani Mandarin (Kinnow**)** export to its major markets along with estimation of impact of different macroeconomic variables on the mandarin exports by using the panel data set.

The value of Wald-test was found as 90.52425 highly significant value of Wald test counts against the null hypothesis (residuals are homoscedasticity) that pooled OLS model was adequate, in favor of alt hypothesis (residuals are heteroscedasticity) the fixed effects alternative. Results of Wald-test also favor in fixed effect model for the Pakistan's Kinnow export with its Kinnow importing countries.

The fixed effect results in Table 4 showed estimated coefficients are very unsatisfying. Partner countries' domestic prices and exchange rates all have an opposite coefficient sign as compared to expectations.

If coefficient sign is expected sign but not significant meaning that standard error is large making the coefficients insignificant such as population of partner country and distance both have expected sign but not significant. According the results of fixed effect model, low Durbin-Watson statistics can be seen. The Durbin-Watson checks for panel testing if autocorrelation in the residuals occurs first order. The rule of thumb is to assume that there is an autocorrelation of first order in residuals when the statistics for Durbin-Watson are much smaller than 2.

Table 4: *Estimation of equation by fixed effects model.*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.258441	1.319631	-2.469207	0.0141*
$L(Price\_j_{jt})$	0.359210	0.245644	1.462316	0.1448NS
$L(Pop\_J_{jt})$	1.266537	0.507568	2.495305	0.0131*
$L(Exch\_J_{jt})$	-0.084673	0.344305	-0.245925	0.8059NS
$L(D\_Production_{it})$	-0.957250	0.467158	-2.049091	0.0414**
$L(Distancei_{jt})$	0.854191	0.260319	3.281325	0.0012*
Adjusted R^2		0.79		
D-W Statistics		0.84		
R^2		0.81		

*Dependent Variable: LOG (K); *, **, *** significance level of 1%, 5%, 10% respectively*

Source: *Author's Calculation*

Table 5: *Estimation of equation by SYS GMM model.*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$LOG(K_{ijt}(-1))$	0.380495	0.019955	19.06771	0.0000*
$L(Price\_j_{jt})$	0.383783	0.075007	5.116626	0.0000*
$L(Pop\_J_{jt})$	0.519256	0.435319	1.192818	0.0234**
$L(Exch\_J_{jt})$	0.989298	0.299915	3.298589	0.0011*
$L(D\_Production_{it})$	0.313007	0.137988	2.268365	0.0240**
$L(Distance_{ijt})$	-0.746468	0.118999	-6.272907	0.0000*
AR(1)		0.0072		
AR(2)		0.8413		
Sargan		1.00		
Instrument rank		26		
Prob.(j-statistics)		0.32279		

Source: *Author's calculations.*
*Dependent Variable: LOG(K); *, **, *** significance level at 1%, 5%, 10% respectively.*

The system GMM approach adopted in Table 5 is the most effective estimation way for this study dynamic panel model as most coefficient are not significant in fixed effect Table 4. Besides, result of Table 5 system GMM model describes that there is first order auto correlation in the difference of disturbing term but no second order autocorrelation, so original hypothesis (there is no auto-correlation) is accepted. Meanwhile, in the Sargan test, the assumption of the validity of all instrument variables cannot be ignored, suggesting that the instrumental variables are also valid. Sargan test P>5 means reliability of the instruments. Furthermore, only a (t-1) lag of the dependent variable used for an instrument variable in order to keep the number of instruments under control. The unit root tests are not used for the dependent and independent variables stationarity, since the time (T) is short (micro panel data). Therefore, the issue of not stationarity is not a concern (Blackburne and Frank, 2007). The Kinnow export level in the previous year was found to have a significant positive effect on export performance of the next year. A large Kinnow export shows that the growth in the Kinnow export flows of the previous year have a positive effect on the current performance. The suggestion is that good relationship with importing countries will increase the future performance of the country's Kinnow export. Table 4 shown lagged Kinnow export coefficient is 0.380495, which implies 1% rise in Kinnow export in preceding year will bring out 0.39 percent increase in Kinnow export of current year and indicated that Pakistan Kinnow exports have a dynamic component in the sense that experience does matter. Prices of trading partners of Pakistan's Kinnow positively influenced the export item. It is revealed that as the prices in the global market rises in order to gain the profit advantage, exporters will shift more quantity (Kannan, 2013). Foreign prices affects significantly to Kinnow export channel. According to findings, if the Kinnow export prices of importing countries raise 1%, resulting 0.383783% increase Kinnow export. According to Nazeer *et al.* (2019), price in a trading partner has a positive and significant impact on Kinnow exports from Pakistan.

Population of the foreign trading partners of Pakistan's Kinnow positively influences the export. According to estimation results, 1% increase in foreign population resulting, 0.519256% increase was reported in the Kinnow export. According, to Javed *et al.* (2016), there was a positive and significant impact of the variable of the population of a trading partner on agricultural exports from Pakistan. If exchange rate of partner country's increased (Appreciation) domestic currency depreciation make exports cheaper in international markets, demand of exports increased caused the improving the Kinnow export. Exchange rate of

partner increased with 1% is calculated to cause an increased in export by 0.989298%, the fluctuation that will occur in the real rate have a significant and positive effect on Kinnow export. Increasing exchange rate was positively affecting citrus exports; meaning was that those countries produce a cheaper citrus have a benefit (ÖZER *et al*., 2016).

It is the determinants of Kinnow export on the supply side. The higher production level is the main cause of the expansion of exports, since surplus output can be exhausted on foreign markets. In an economy these surplus by exporting production create foreign reserves. So we expect the Kinnow production positively affecting Kinnow export. In empirical literature production (output) is statistically positive and significant impact on exports (Martina, 2015). The fluctuation that will occur in the real rate has a positive and highly significant impact on kinnow export. According to Javed *et al*. (2020), there was a positive impact of a rise in the exchange rate of the trading partner in the case of basmati exports from Pakistan.

The transport cost (peroxide by distance) was negatively affecting competitiveness of Kinnow. The coefficient of distance was negative but significant which implies that a unit increase in distance the quantity of export decreased from the international market. Roy *et al*. (2012) found that the estimated distance coefficient showed a high level significance of 1% with the predicted sign, showing an approximate value of -0.746468 %, as a result of an increase in distance of 1%. According to Hayat and Khatoon (2021), there was a positive impact of joint border of Pakistan with trading markets, which shows encouraging impact on exports of basmati from Pakistan. Transportation cost (peroxide by distance) affects the citrus export as negatively and significantly (ÖZER *et al*., 2016). Therefore, increased distance caused cost increases made Kinnow export more costly, reducing the market (loss the competition). The importers would become more attractive to the mandarin of another country.

Conclusions and Recommendations

According to the results, the partner countries' population has positive and significant affect on the Kinnow export. It is suggested that Pakistan concentrate more on economies with a large production of the Kinnow commodity importing nation. A decrease in relative domestic currency, depreciation of exchange rates makes export an expensive to the foreign markets. Which ultimately causing an increase in demand of export, so it can be assumed that real exchange rate would positively affect Kinnow exports. The domestic exchange rate has a negative impact on exports. There was an adverse effect between domestic exchange rate and exports. If the exchange rate of partner country's increased (Appreciation) domestic currency depreciation make exports cheaper in international markets, demand of exports increased caused the improving the Kinnow export and its competitiveness. Exchange rate was positively and significantly affecting Kinnow export and its competitiveness. Stable exchange rates include the involvement of strong government pricing policies to make Mandarin more competitive on world markets. This will address Pakistan's low export and production ratio. While making trade policies for existing and exploring the new markets, Pakistan should consider the factors of the total population, market distance, stable exchange rate, domestic production and its quality at the same time.

Novelty Statement

Literature revealed that most of the research work on mandarin was based on primary data. To fill the research gap, present study is made to find the impact of major variables on export by using second-ary data.

Author's Contribution

Shumaila Nazir: Conceived the main theme of the research and prepared initial draft of manuscript.
Iqbal Javed: Supervised the whole research and proof read the manuscript.
Muhammad Luqman: Data analysis.
Azra: Reviewed the literature and finally edited the paper.

Conflict of interest
The authors have declared no conflict of interest.

References

Ahmad, B., M. Mehdi, A. Ghafoor and H. Anwar. 2018. Value chain assessment and measuring export determinants of citrus fruits in Pakistan. Pak. J. Agri. Sci., 55(3): 691-698. https://doi.org/10.21162/PAKJAS/18.6056

Akhtar, W., M. Sharif and H. Shah. 2009. Compet-

itiveness of Pakistani fruits in the world market. Lahore J. Econ., 14(2):125-133. https://doi.org/10.35536/lje.2009.v14.i2.a5

Bekele, W.T. and G.M. Fekadu. 2019. A dynamic panel gravity model application on the determinant factors of Ethiopia's coffee export performance: https://doi.org/10.1007/s40745-019-00198-4

Blackburne, F. and M. Frank. 2007. Estimation of nonstationary heterogeneous panels. Stata J., 7(2):197–208. https://doi.org/10.1177/1536867X0700700204

FAO. 2018. Food and Agricultural, Statistics, Italy. Available online with updates at www. fao. org/faostat/en/.

FAO. 2019. Food and Agricultural, Statistics, Italy. Available online with updates at www. fao. org/faostat/en/.

Fatima, K., U. Nisar and H. Yasmin. 2019. Factors affecting the bilateral trade of Pakistan with major trading partners. J. Econ. Impact, 1(1):19-28.

Ghafoor, A., K. Mustafa., I. Zafar and K. Mushtaq. 2010. Determinants of mango export from Pakistan. J. Agric. Res., 48(1):105-119.

Ghafoor, U., S. Muhammad and K.M. Chaudhary. 2008. Constrains in availability of inputs and information to citrus (Kinnow) growers of tehsil Toba Tek Singh. Pak. J. Agric. Sci., 45(4):520-522.

GOP. 2018. Government of Pakistan. Agricultural Statistics Year Book 2018-19. Ministry of National Food, Security and Research, Government of Pakistan, Islamabad, Pakistan. Granger and Newbold, 1974, Spurious Regressions in Econometrics. J. Econ., 2: 11–20.

GOP. 2019. Government of Pakistan. Agricultural Statistics Year Book 2018-2019. Ministry of National Food, Security and Research, Government of Pakistan, Islamabad, Pakistan.

Haleem, U., K. Mushtaq, A. Abbas and A.D. Sheikh. 2005. Estimation of Export Supply Function for Citrus Fruit in Pakistan. Pak. Dev. Rev., 44(4): 659–672. https://doi.org/10.30541/v44i4IIpp.659-672

Hayat, M.M. and Khatoon, R. 2021. Determinants of Basmati Exports from Pakistan: A Panel Data Analysis. J. Econ. Impact, 3(1): 12–18. https://doi.org/10.52223/jei3012102

ITC. 2018. International Trade Center. Trade Maps: Trade Statistics for International Business Development. https://intracen.org.

ITC. 2019. International Trade Center. Trade Maps: Trade Statistics for International Business Development. https://intracen.org.

Javed, I., Rehman, A., Nabi, I., Razzaq, A., Saqib, R., Bakhsh, A. and Luqman, M. 2020. Performance and macroeconomic determinants of basmati rice exports from Pakistan. Sarhad J. Agric., 36(2): 617-624. https://doi.org/10.17582/journal.sja/2020/36.2.617.624

Javed, I., M. Ashfaq, S.A. Adil and K. Bakhsh. 2016. Analysis of agricultural trade between Pakistan and United Arab Emirates: An application of gravity model. J. Agric. Res., 54(4):785-799.

Kannan, M. 2013. The Determinants of Production and Export of Natural Rubber in India: IOSR J. Econ. Finance, 1(5):41-45. https://doi.org/10.9790/5933-0154145

Khan, S.A., M. Naseer, A.U. Malik, S.M.A. Basra, M.S. Khalid, S. Khalid, M. Amin, B.A. Saleem, I. A. Rajwana and Moeen-Ud-Din. 2011. Location, Soil and Tree Nutrient Status Influence the Quality of 'Kinnow' Mandarin. Int. J. Agric. Biol., 13(4):498–504.

Martina, B.S., V. Valentina and S. Blanka. 2015. Determinants of manufacturing industry exports in European Union member states: a panel data analysis, Economic research-Ekonomskaistraživanja, 28(1):384-97. https://doi.org/10.1080/1331677X.2015.1043781

Memon, N.A. 2017. Citrus fruit (Kinnow): Punjab produced 98% of production, exclusive on Kinnow: Pak. Food J., 29–31.

Naseer, A., M. Ashfaq, M. Abid, A. Razzaq and S. Hassan. 2016. Current status and key trends in agricultural land holding and distribution in Punjab, Pakistan: Implications for food security. J. Agric. Stud., 4(4):14-27. https://doi.org/10.5296/jas.v4i4.9670

Nazeer, S., I. Javed, A. Bakhsh, M. Yasin, H. Javaid and K. Fatima. 2019. Margin and determinants of mandarin (Kinnow) export from Pakistan. Pak. J. Agric. Res., 31: 32(1):205. https://doi.org/10.17582/journal.pjar/2019/32.1.205.211

Nguyen, B.X. 2010. The determinants of Vietname exports: static and dynamic panel gravity approaches. Int. J. Econ. Finance, 2(4):112–129. https://doi.org/10.5539/ijef.v2n4p122

Özer, O.O. and O. Koksal, 2016. Determinants of Turkey's citrus exports: A gravity model approach. New Medit: Mediterranean Journal

of Economics, Agriculture and Environment= Revue Méditerranéenned'Economie Agriculture et Environment, 15 (3):37-42.

Raza, S., Y. Ali and F. Mehboob. 2012, Role of agriculture in economic growth of Pakistan: IDEAS Working Paper Series from RePEc. 180-186.

Roy, M and M.I. Rayhan. 2012. Import Flows of Bangladesh: Gravity Model Approach under Panel Data Methodology. Dhaka Univ. J. Sci., 60(2):153-157. https://doi.org/10.3329/dujs.v60i2.11485

TDAP. 2018. Trade Development Authority of Pakistan. Available online at https://tdap.gov.pk.

Yishak, T. 2009. Determinants of Ethiopia's export performance: A gravity model analysis: Trade and development discussion. Paper No. 01/2009, BKP Development Research and Consulting, Germany.