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Empirical Study of the Effects of One District One Product (ODOP) Initiative on Indian Export Performance: A Panel Data Analysis

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Abstract

One District One Product (ODOP) scheme in India was based on the vision of converting the districts into manufacturing and export zones and thus enhance equal regional development and economic growth. This paper focuses on the effectiveness of ODOP in terms of export performance in Indian states and union territories by using a balanced panel dataset that consists of 36 cross-sectional units observed between 2018 and 2021. A generalized least squares (GLS) regression model had been used to examine the short-term and time-varying impacts of ODOP with Gross State Domestic Product (GSDP) and the Human Development Index (HDI) as the control variables. The findings show that ODOP effects exports positively in the long run as shown by the marginally significant interaction between ODOP and post implementation time. GSDP is an influential and statistically significant predictor of export performance positively underscoring the possibility of underlying economic capacity. In the form of descriptive analyses, there is also a considerable variation between weak and strong ODOP implementation in terms of export outcomes, and the steep recovery in terms of mean exports in the post-2020. Further research could examine longer time spans and using data at the district level, which, in turn, will allow assessing the structural implications of the ODOP scheme more meticulously. Moreover, the incorporation of new econometric models and other policy factors might improve the ability to causally infer and provide a more comprehensive view of the long-term effectiveness of the scheme.

Keywords: *One District One Product (ODOP); Export Performance; Panel Data Analysis; Generalized Least Squares (GLS); Gross State Domestic Product (GSDP); Human Development Index (HDI); Regional Economic Development; India*

Introduction

ODOP aims at making each and every district in India a manufacturing and export center by discovering products with export potential. It is expected to promote economic growth, generate

employment, and attract rural entrepreneurs, which is included in the Aatma Nirbhar Bharat goal. It is also operationally connected with the program of the districts as export hub in which two committees will be established to stimulate the development of the export: State Export Promotion Committee (SEPC) and District Export Protection Committee (DEPC) (Mishra, n.d.). The close interaction between exports and GDP in terms of morality implies that the level of exports could greatly influence the stability of the economy, and thus, any issues that could influence the level of export should be dealt with (Alhafith, 2025). A study conducted in India tested the Bi-directional causality between economic growth and export wherein it was found that there exists a long-run equilibrium between the GDP and export (Ray, 2011). Cointegrating export and GDP at current prices are positive causal. The short-term fluctuations in export have a positive impact on GDP and its elements (Pandey, 2006). The export promotion policy is inclusive and sustainable growth-supporting (Kumar, 2015). State GDP and exports have positive correlation indicating that an increment in exports leads to an increment in state GDP. This correlation eventually affects the per capita income in a positive fashion in Indonesia within the new normal era (Goestjahjanti, n.d.). Exports have a positive correlation with GDP in Pakistan with a one percent growth in exports increasing GDP by 0.81%. This implies that improvement of exports may have a major role in economic growth (Ahmad et al., 2012). There is a long run correlation between the GDP growth and export growth in India between 1971 and 2005, it proves that export shocks are a major determinant of economic growth and finally the research establishes that export shocks are unidirectional, that is, exports determine GDP growth and not the other way round (Kundu, 2010). There is dependence between national GDP and exports in India, with the discovery that GDP development leads to the growth of exports, which confirms the growth led exports hypothesis, and not a direct interdependence between the state GDP and exports (Mukherji & Pandey, 2014). There is a strong long-term relation between exports and GDP of BRICS countries, and the bilateral causality between GDP and exports of most countries, except Brazil, which has a one-way causal relationship between GDP and exports (Srinivasan, 2016). The relationship between the volume of export and GDP growth was found to be strongly positive especially in developed economies ($r = +0.98$), which suggests that the high level of exports is a significant contributor to the growth of the economy, according to the export-led growth model (Dasari et al., 2019). Exports and GDP have a bidirectional relationship implying that fluctuations in the level of exports can affect the GDP growth and vice versa. Nevertheless, economic growth does not have a causal impact on export instability, which indicates a compound effect between the two variables (Singh, 2024). The manufacturing exports of medium and high-technology significantly increase the Human Development Index (HDI) in the OECD nations (Kozal, 2024). A positive strong correlation was found between trade and export with Human Development Index (HDI) in all income classes of the Organization of Islamic Cooperation (OIC) nations (Singh, 2024). This research observed that aggregate exports and human development index (HDI) have a significant positive relationship in Pakistan (Jawaid & Waheed, 2017). Another study found a stable equilibrium between the export and the per-capita GDP as indicated by the regression and the error correction model. Co-integration tests were used to analyze the correlation between export and per-capita GDP. The data analysed was between 1984 and 2007. The findings indicate that there is a strong correlation between export operations and economic development in the province of Shandong (Chen, n.d.). The theory of export led growth is not valid in SAARC countries since it shows that GDP has no significant correlation with exports in the fixed and random effects model. The co-integrating aspect between the exports and growth although not significant in terms of causality implies that even though exports do not primarily contribute to economic growth directly, they are still a relevant element within the whole economic structure, which is problematic to policymakers in order to boost economic growth (Kundu, 2013).

Literature Review

The ODOP scheme contributes greatly to regional GDP of India. A study used Vector Autoregression (VAR) as well as Johansen Co-integration to determine the causal relationship between

the GDP growth and ODOP. The initial findings prove that the ODOP implementation enhances local production and market accessibility. The study indicates that ODOP has incorporated the integration of regional economies into national and global value chains (Kumar et al., 2024). Export and Gross Domestic Product (GDP) were found to be co-integrated. It was found that a long-term equilibrium relationship exists between the two. The Vector Error Correction Model (VECM) indicated that the lagged (1) terms of both Export and GDP do affect one another in the determination of the current value of each of them. The Granger causality test revealed that there was a short run relationship between Export and GDP with both of the causality having the same direction as Export to GDP. The findings indicate that economic growth in India is high because of the high exports (Venkatraja, 2015). The discussion confirms that industrial exports have a strong positive impact on the gross domestic product (GDP) of Boyaca. Primary exports also play a positive role as far as contribution to GDP is concerned, though not as much as industrial exports. According to the Granger causality test, industrial as well as primary export causes GDP growth. Impulse-response tests support the correlation between exports and economic growth. According to the study, Boyaca ought to come up with an export-oriented policy to boost foreign trade, especially in the manufacture and primary products (Caceres Rodriquez et al., 2018). There is a one-way relationship between exports and economic growth in Indonesia in the period 1999-2008. GDP was found to influence exports, which implies that the relationship between exports is internally generated. The F-statistic of 18.2442 is more than 4.46, which means that GDP did not Granger cause exports. Nevertheless, at the 5 percent level, the p-value of 0.0209 is significant, which confirms the relationship. These findings indicate that changes in the GDP may result in increases or decreases in exports in the given period (Novianingsih & Budiningharto, 2011). The analysis indicated that there was a bi-directional relationship between GDP and Indian exports. It confirmed the value of exports in the growth process after economic reforms in the early 1990s. It was found that the hypothesis based on the fact that the export-led growth holds true in the Indian economy in the period 1990-91 through 2011-12. The empirical evidence revealed that there was a substantial correlation between overall export of goods and services and real GDP (shamurailatpam, 2013). In another study which used time-series data between 1997 and 2015 involving seven BIMSTEC countries which used unit root analysis, co-integration and Granger causality. Results show that GDP and exports have bi-directional causality, which supports the idea of export-led growth and growth-led export policies in the BIMSTEC region (Kaur et al., 2017). Another study conducted in Bangladesh found a two way causality between export revenue and GDP using the Johansen co-integration test which revealed that there existed a long run equilibrium between the export revenue and GDP. The model of the vector error correction (VECM) did not show any statistically significant long-run relationship, the Wald test showed that the relationship between export revenue and GDP was statistically significant in the short run. The variables were all non -stationary at level but stationary after the initial differencing (Dey, 2018). Exports positively and significantly impact Gross Regional Domestic Product (GRDP) as a 1 percent increase in exports results in a 0.062362 per cent increase in GRDP. The effect of imports on GRDP is negative but statistically insignificant with an increase of 1 per cent in imports being associated with a decrease of 0.075382 per cent in GRDP. GRDP has a one-way causality with exports and imports have a one-way causality with GRDP. There existed a long-run equilibrium between GRDP, exports, and imports by applying the Johansen cointegration test (Leasiwal et al., 2025). BRICS countries are bi-directionally related to exports and GDP using the VAR model, and the effects are very high, especially those between Brazil and China. These results emphasize the economic growth effects of exports positively (Nunez Mora Mata Mata, 2019). Another analysis estimated the correlation between exports and economic growth in Turkey based on Granger causality analysis between 1975 and 2008. It was discovered that the growth in exports does not facilitate the growth in economic growth realized in Turkey (Takim, 2010). The long-run association between real exports and real GDP is strong, where a 1.0 percent rise in real exports would cause a 0.53 per cent rise in real GDP in 107 countries in the period between 1990 and 2018 (Sharma, 2022). There exists a unidirectional causality between exports and the gross domestic product of Romania, suggesting that although exports determine economic growth, there is lack of cointegration between the two variables. This implies that there should be export promotion policies to boost growth (Dumitriu et al., 2010).

Another study revealed that the relationship between fuel exports and human development is positive and statistically significant (r = 0.020). There is also a positive and statistically significant relationship between ore exports and human development (r = 0.050). Export of high-technology products is positively and statistically correlated with human development (r= 0.090) (Gani, 2019). Human capital, as quantified by the Human Development Index (HDI), has a substantial effect on the export performance in East Asia (Nam, 2025). There is a positive correlation between trade and exports on the one hand and Human Development Index (HDI) on the other. It proposes that growth in trade is related to the future, increment in social welfare, which is measured in terms of HDI, which includes education, literacy, and income. The estimation makes use of a panel data model and a generalized method of moments (GMM) process, which further supports the point that trade is a positive factor to social development and the quality of life in a country (Davies et al., 2006).

Methodology

Research Design

The study used a quantitative panel data analysis to examine the effects of the One District One Product (ODOP) scheme on the performance of exports of Indian states and union territories.

Study Area

The study done in India, as ODOP is a nationally adopted policy, with a goal to convert a district into an export-oriented hub and a balanced socio-economic development.

Study Population and Sample

The study population was the Indian states and the union territories that had the ODOP scheme, a sample of 36 states and union territories was chosen with the help of purposive sampling, according to the information availability and the uniform implementation of ODOP.

Data Source & Variables

To conduct the study, secondary data was used. The dependent variable was exports for which data had been collected from the Ministry of Commerce Dashboard, and the independent variables were GSDP, ODOP, HDI, Post ODOP, Time after, Post, and Time after ODOP. Data for GSDP was collected from the Directorate of Economics & Statistics of respective State Governments. ODOP data was collected from Open Government Data (OGD) Platform India. Data for HDI was collected from Global Data Lab.

Data Collection

The data were collected based on the documentary and archival files, involved state-level export values, Gross State Domestic Product (GSDP), Human Development Index (HDI) and ODOP policy measures during 2018 to 2021.

Validity and Reliability

In order to establish the validity and reliability of the information, cross-checking with various reliable sources and cross-checking over time were used.

Data Analysis Techniques

Data obtained were analyzed through Stata statistical software with the techniques applied being random-effects generalized least squares (GLS) regression with marginal effects and descriptive graphical analysis to interpret the data quantitatively.

Analysis

The main hypothesis of the proposed research is that the One District One Product (ODOP) scheme affects the performance of exports in Indian states and union territories significantly and time-dependently. The basis of this hypothesis is that the industrial and export-promotion measures like ODOP takes time to convert to quantifiable economic output because of the cost of initial adjustment, the learning effect, and the fact these measures take time to build production and market connections. This hypothesis is partially supported by the empirical findings (Kumar et al., 2024). It was observed that the initial introduction of ODOP does not cause immediate improvement in export performance. Nevertheless, the hypothesis can be supported in case the time aspect of ODOP implementation is taken into consideration. The interaction term that contains the time since ODOP implementation has a positive and slightly significant coefficient, which means that the effect of ODOP on exports is enhanced as the time of implementation goes by. This observation means that the action of ODOP is not instantaneous but gradual and follows as time goes by. This interpretation is further supported by descriptive graphical analyses. Regions that have stronger ODOP implementation have higher levels of average export and the spread of exports escalates in later periods in ODOP related regions especially after 2020. Such trends are consistent with the hypothesis of ODOP functioning with slow structural change as opposed to the short-run export stimulation. On the whole, the findings indicate that the hypothesis is proven dynamically, meaning that ODOP is associated with export growth not in the short term but in the long term. This highlights the significance of continued application and complimentary economic conditions in the actualization of the long-term export gains of ODOP. We rejected the following hypothesis: H_0, H_{0a}, H_{0b}, H_{0c}, whereas accepted the null hypothesis H_{0d}.

Hypothesis

H_0: There was no significant relationship between One District One Product (ODOP) and the performance of exports among Indian states and union territories.
H_1: There is a significant relationship between One District One Product (ODOP) and the performance of exports among Indian states and union territories.
H_{0a}: The ODOP scheme does not have any significant time effect on exports.
H_{1a}: There is a significant increase in the effect of the ODOP scheme on exports over time since its inception.
H_{0b}: No significant difference exists between the performance of export in strong and weak ODOP regions.
H_{1b}: Areas with stronger implementation of ODOP demonstrate better performance in exports as compared to areas with weaker implementation.
H_{0c}: There is no significant influence of Gross State Domestic Product (GSDP) on the export performance.
H_{1c}: Gross State Domestic Product (GSDP) positively and significantly influences the export performance.
H_{0d}: There is no significant relationship between HDI and performance of exports.
H_{1d}: There is a significant relationship between HDI and performance of exports

Table 1: Random-effects GLS regression

Random-effects GLS regression	Number of obs = 144
Group variable: CID	Number of groups = 36
R-squared:	Obs per group:
Within = 0.2277	min = 4
Between = 0.8057	avg = 4.0
Overall = 0.7679	max = 4
Wald chi2(7) = 164.23 corr(u_i, X) = 0 (assumed)	Prob > chi2 = 0.0000

Export	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
post	-16.30665	2590.294	-0.01	0.995	-5093.191	5060.577
time_after	212.7285	1562.604	0.14	0.892	-2849.918	3275.375
odop	-9273.778	3552.851	-2.61	0.009	-16237.24	-2310.318
post_odop	-5076.301	3667.888	-1.38	0.166	-12265.23	2112.627
time_after_odop	4166.284	2217.087	1.88	0.060	-179.1268	8511.695
gsdp	.0388036	.0037227	10.42	0.000	.0315072	.0460999
Hdi	-2460.308	11129.23	-0.22	0.825	-24273.19	19352.58
_cons	-619.714	7684.918	-0.08	0.936	-15681.88	14442.45
sigma_u	7641.167					
sigma_e	4701.7425					
rho	.72536546	(fraction of variance due to u_i)				

Table 1 gives the findings of a random-effects generalized least squares (GLS) regression estimating the determinants of exports with a balanced panel of 36 cross-sectional units (CIDs) during 4 time periods (a total of 144 observations). The random-effects model is a model in which the individual-specific effects are unobserved and are assumed to have no correlation with the explanatory variables (Das, 2023).

Model Fit and Diagnostics

The model has a high overall fit as the R^2 is 0.7679, which means that about 76.8 percent of the total variation in exports is captured by the regressors. The between R^2 (0.8057) is large as compared to the within R^2 (0.2277), which implies that the change in exports is more likely to be driven by variations across cross-sectional units than the variation between units over time. The Wald chi-square value (kh2 = 164.23, p = 0.001) demonstrates that the explanatory variables are jointly significant which proves the overall statistical validity of the model. The calculated value of ρ, r = 0.725, suggests that about 72.5 percent of the overall variation in exports can be explained by unobserved, time-irrelevant cross-sectional effects, and it can thus be reasoned that a panel data structure is suitable and that the random effects are indeed relevant.

Key Coefficients Interpretation

The post dummy variable is statistically insignificant with a negative coefficient (p = 0.995) indicating that there is no direct structural change in exports after the intervention period. Equally, time

after cannot be statistically significant (p = 0.892) and shows that there is no systematic time effect on exports following the intervention. The odop variable has a negative and significant coefficient (b = 9273.78, p = 0.009). It means that, other things being equal, the export intensity in regions related to ODOP was smaller, which may indicate potential short-term adjustment fees or difficulties in implementation. The post odop is negative but the value is not significant (p = 0.166) meaning that the immediate post-intervention effect of ODOP on exports is not statistically significantly different to zero. Contrastingly, time after odop is good and slightly significant at the 10 percent point (b = 4166.28, p = 0.060). This implies that ODOP might not have produced an immediate impact, but it is linked to slower increase in the export performance with time, which is in line with delayed policy effects. The coefficient (b = 0.0388, p < 0.001) of GSDP is positive and very significant, which means that higher rates of economic output are closely related to increased export. This observation is consistent with the normal trade theory, which postulates that there is a positive correlation between the economic capability of the region and the exporting performance (Francová & Breveníková, 2012). The HDI coefficient is not significant and is -0.825 (p = 0.825), which means that changes in levels of human development do not directly affect exports in this specification. The constant term is statistically insignificant and this means that there is no meaningful kind of baseline export level when all regressors take the value of zero.

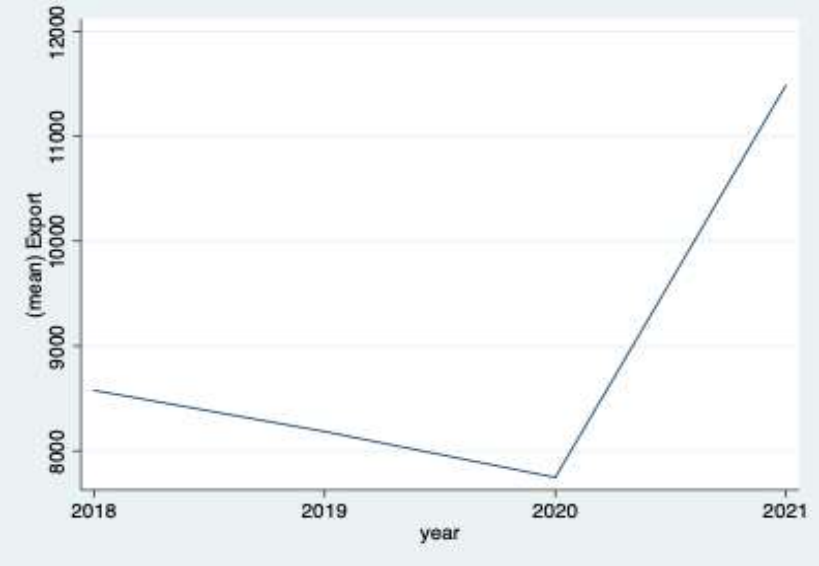

Figure 1: Average Export vs Year

Figure 1 shows the time dynamics of averaged export values during the four years of operation, 2018-2021. The graph demonstrates that there is a non-linear pattern of export performance whose trend showed a decline then rebounded sharply. Mean exports show a downward trend between 2018 and 2020 with the lowest level recorded in 2020. Such a fall would imply a time of poor environment in terms of export performance, which could be an indication of structural shocks, adjustment costs or external shocks affecting the exporting regions at that time. Conversely, growth in the mean exports is significant and steep in the year 2020-2021, with the level of export skyrocketing and exceeding the level of 2018. The regression results are also consistent with the graphical evidence, especially, the insignificance of the immediate post-intervention dummy and the positive value of the time-after-ODOP interaction term. Although the exports did not realize growth immediately after the policy intervention, the extreme upward trend witnessed during the subsequent time justifies the explanation of delayed policy impacts where the gains are realized with time as opposed to instantaneously. Also, the visual trend supports the idea that the dynamics of export growth are in time-dependence, which underlines the relevance of the interaction terms and time trends in assessing the policy effects within a panel data system.

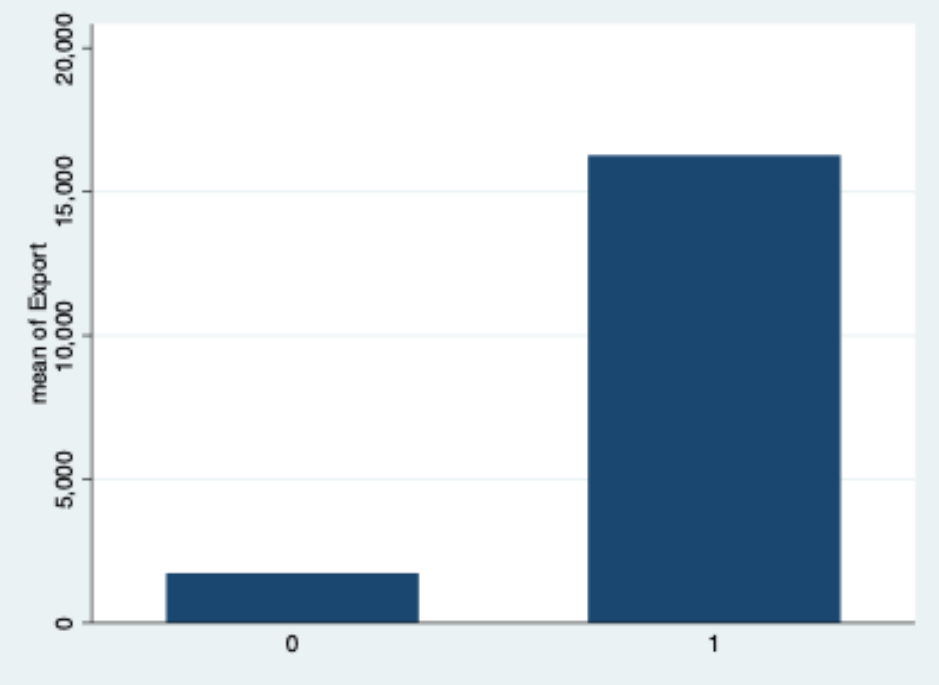

Figure 2: Average Exports vs Intensity of ODOP Implementation (0 - Weak, 1 - Strong)

Figure 2 compares the mean export values in regions with a weak ODOP implementation (coded 0) and strong ODOP implementation (coded 1). The figure demonstrates that there is a significant difference in the average performance in export between the two groups. The mean exports of the region with strong ODOP implementation are significantly higher than those of the region with weak implementation whereas in regions where ODOP is weak, the average export values are relatively small, in those where the implementation is strong, the export values are several points i.e. 3-4 times higher, which is a significant difference in the export capacities. This high contrast implies that the intensity of ODOP implementation is positively linked to the performance in export. Greater implementation can be an indicator of more institutional support, higher clustering of production, greater market access, or increased policy effectiveness, which can drive the level of exports upwards. Nevertheless, one should remember that this number is strictly descriptive and fails to account for the presence of confounding variables like the economic size of the region, infrastructure, and human development. Thus, the difference observed should be taken as an association and not as a causal effect. The visual evidence supplements the results of the regression analysis, especially its positive (but delayed) contribution of the time-after-ODOP interaction term and its significant contribution of macroeconomic capacity (GSDP). Collectively, these findings indicate that ODOP performance level might not only be linked to adoption, but also the quality and depth of implementation, where deeper implementation is correlated with better export performance in the long run.

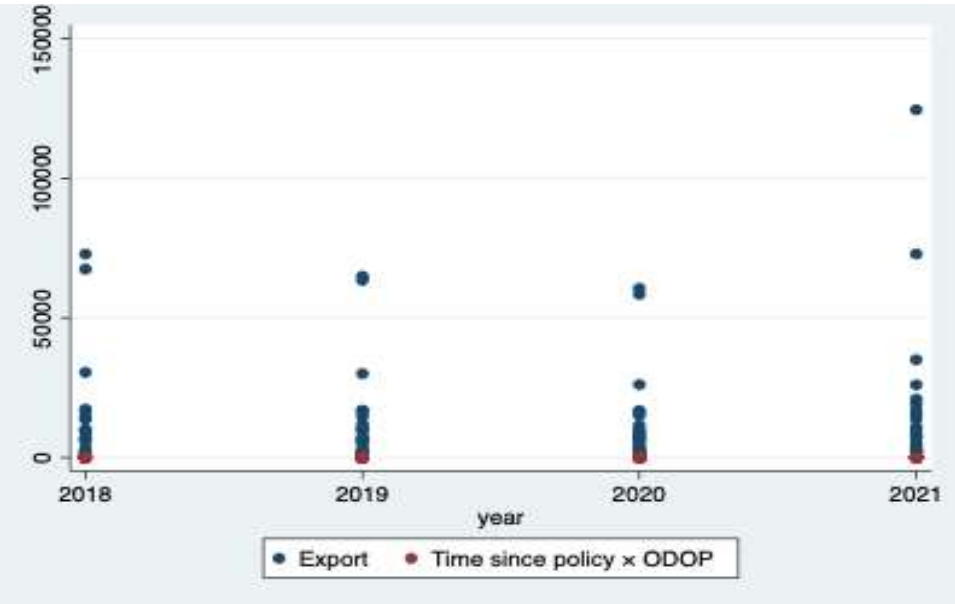

Figure 3: Time Since Policy Implementation X ODOP vs Exports.

Figure 3 shows a scatter diagram of the dependence between values of exports and the product of time since the implementation of policies and ODOP over the years 2018-2021. The plot shows significant heterogeneity in the levels of exports among the regions and years with export values being very low and also having very high outliers. An earlier period (2018-2019) of export shows a significant concentration of values at the lower values and minimal spread. This is a show of comparatively low export performance in the early stages of the introduction of ODOP. In comparison, during the later years, especially 2021, the export values are much more dispersed, and some regions show significantly larger export values. These greater export realizations are likely to align with greater values of the interaction term implying that the regions with exposure to ODOP are likely to register greater export results with time. The growth of dispersion and the rising trend of the export values of the regions that are related to ODOP also point to the policy effect that is dynamic and not instantaneous. The interaction term embodies the fact that ODOP has a stronger effect on exports as time passes, as this is what is needed to yield results in the markets as far as production specialization, integration of the supply chain, and enhancement of market access become realized. The graphical trend is in line with the positive and marginally significant coefficient on the time-after-ODOP interaction term of the random-effects GLS regression. Although the scatter plot is not a causal implication, it is a descriptive agreement that the growth of exports in ODOP regions is reinforced as the post implementation period goes up.

Conclusion

The research examined the efficacy of One District One Product (ODOP) scheme in improving the performance of exports in Indian states and union territories based on a panel data. The empirical results indicate that ODOP fails to yield instant export profits after its inception. Rather, the effect of the policy on exports can be said to be time-dependent with the positive impacts accruing over time as the time of implementation goes on. This points to the existence of expenditure on adjustment and time to achieve specialization in production, the development of infrastructure and integration into the market. The findings also indicate that the Gross State Domestic Product (GSDP) is conclusive and therefore it is true that regions with stronger economic base are more likely to enjoy export-promotion programs like ODOP. Contrarily, the Human Development Index (HDI) shows no statistically significant direct impact on exports in the study period, and hence, the question is whether human development can have an indirect impact on exports or whether it impacts them in the long run. The results are confirmed by descriptive

graphical analyses that reveal a robust recovery in exports following 2020, greater average exports in those regions with more successful ODOP implementation, and that export dispersion in ODOP-related regions increases over time. ODOP is more effective as a long-term structural policy and not a short-term stimulus. Although the study is limited by a comparably short time frame and the lack of determining causality, it provides useful knowledge on the dynamic nature of export-promotion policy. Future studies can elaborate on the analysis with more data at district level, with longer time horizons, or with other econometric methods in order to better estimate the developmental long-term effects of the ODOP. The results highlight the need to implement the objectives of the ODOP in a long-term perspective, regional economic capacity, and complementary policies to convert them into concrete export results.

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