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Evaluating the Economic Impact of Pradhan Mantri Awas Yojana on State GDP in India

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ABSTRACT

This study examines the impact of the Pradhan Mantri Awas Yojana (PMAY) on economic growth in India, focusing on its contribution to State Gross Domestic Product (SGDP). The research aims to assess the effects of PMAY-Rural (PMAY-G) and PMAY-Urban (PMAY-U) on SGDP while considering the influence of key socioeconomic factors, including income, health, education, population, and gender development. The study employs panel data covering 28 Indian states and 8 Union Territories for the period 2016–2022, analyzed using Feasible Generalized Least Squares (FGLS) to address heteroskedasticity and autocorrelation issues. Results reveal that PMAY in Urban areas significantly enhances SGDP, whereas PMAY in Rural areas does not have a meaningful direct impact. Among social indicators, income, population, and the Gender Development Index show strong positive associations with state GDP, while health and education indices are statistically insignificant. These findings suggest that PMAY-Rural primarily improves household living standards, poverty alleviation, and social empowerment, whereas PMAY-Urban drives economic growth through construction activities, ancillary industries, and employment generation. The study highlights PMAY's dual role as a social welfare initiative and an economic growth instrument. Policy implications include the need for differentiated strategies for rural and urban housing programs, increased private sector engagement in urban projects, and NGO-led awareness campaigns to ensure effective participation and utilization of scheme benefits. Overall, the research demonstrates that targeted housing interventions like PMAY can significantly contribute to inclusive economic development while enhancing socio-economic conditions for beneficiaries.

Keywords: PMAY, Urban, Rural, GDP, Income, Population, Housing, Poverty

ISSN: 2455-8834

Volume:10, Issue:11 "November 2025"

1. Introduction

1.1. Contextual Background

In India, the rapid pace of urbanization and rural-to-urban migration has led to serious housing shortages and a proliferation of slums [1, 2]. The surge in worker migration to find work and higher quality living has caused a housing shortage of 51 million units by 2011 [3]. Urbanization has caused a shortage of land, overcrowded transportation, and significantly expanded basic services like water supply and electricity in cities. [1, 2]. Even though India has had a long history of institutions and policies for housing, their influence has been minimal because of ineffective allocation of resources and uncertain policy designs [2, 1]. Hence, there is an urgent requirement for large-scale policy intervention for addressing affordable housing and inclusive development.

The Pradhan Mantri Awas Yojana (PMAY) came into existence in 2015 as an integrated housing scheme to accomplish "Housing for All" under an inclusive and participatory system. This scheme upgraded the previous Indira Awas Yojana (IAY) in 2016, adopting its rural housing emphasis while bringing it to urban areas with PMAY-Urban and PMAY-Gramin components [4]. PMAY-Gramin has a direct focus on rural development, in which it offers housing support for enhancing the livelihood of rural people, focusing on the basic infrastructure requirements crucial for survival [5]. PMAY has demonstrated positive outcomes in urban areas through its holistic approach, while maintaining the focused rural influence of its forerunner, according to empirical evidence [4]. Moreover, research on public opinion suggests that the initiative fosters socio-economic change among impoverished and vulnerable segments of society by offering housing and other benefits [6].

The housing industry is a major economic stimulus through various mechanisms. Housing development generates high-level employment opportunities for both skilled and unskilled labor forces, with the industry being very labor-intensive and employing more than 35 million Indians in addition to indirect employment [7]. The industry creates high multiplier effects, with an increment in expenditure able to create as much as five times the income, and contributes around 11.1% of India's GDP [7]. There are around 250 ancillary industries, such as cement, steel, brick, and wood, that rely on construction work [7]. Moreover, housing development exhibits strong employment linkages, with benefits often being inversely related to housing prices [8]. The industry facilitates financial inclusion by housing finance instruments and thus forms a complementary relationship where financial sector growth is driven by housing finance but, in turn, gains from it [9]. Government programs such as the Pradhan Mantri Awas Yojana also augment these connections by credit-linked subsidy schemes [10].

ISSN: 2455-8834

Volume:10, Issue:11 "November 2025"

1.2. Literature Review

The effects of the PMAY scheme are explored largely in the empirical studies. In their 2019 paper, Jayraj Gohil and Zarna H. Gandhi analyze the PMAY scheme initiated in 2015 to meet the increasing housing deficit in India as a consequence of fast-paced urbanization. The program, administered through four verticals Beneficiary Led Construction (BLC), Affordable Housing in Partnership (AHP), Credit Linked Subsidy Scheme (CLSS), and In-Situ Slum Redevelopment (ISSR) - provides financial support, interest subsidies, and facilitates public-private partnerships. In its resolve, PMAY also witnesses construction delays, land acquisition problems, poor quality, and sometimes fake claims. The research recommends enhancing transparency, enhancing monitoring measures, developing the capacity of the implementing agencies, and including the beneficiaries so that housing is sustainable and habitable [11].

In the same realm, another study discusses the perception of the public towards the PMAY scheme, emphasizing its impact on the socio-economic transformation of the poor and weaker segments of society. The study consisted of a survey of 100 people to evaluate different parameters like socio-economic status, hindrances to enhancing income levels, savings behavior, use of loans sanctioned, and the importance of the government scheme in enhancing the standard of living. The study also identifies socio-economic empowerment of beneficiaries and loan repayment trends, shedding light on the effectiveness of the PMAY in increasing the standard of living among the targeted group [12]. Similarly, the purpose of Pradhan Mantri Awas Yojana (PMAY) Scheme in India is explored by another research. It was found that PMAY primarily aims to offer low-cost housing to economically weaker sections and middle-income groups in India. Moreover, the study points out the threats of quick urbanization, resulting in housing deficiencies and substandard living conditions, which the PMAY scheme seeks to rectify. By utilizing secondary data, the study produces a report on the implementation of the scheme and its impact on elevating the standard of living for intended recipients [13].

Several researchers have investigated the Pradhan Mantri Awas Yojana (PMAY), a government initiative that targets the housing shortage, particularly among the urban poor. The investigation focuses on the PMAY framework, which comprises four primary elements: Slum Redevelopment, Affordable Housing through Credit Linked Subsidy Scheme (CLSS), Affordable Household in Partnership with States/Union Territories for the Economically Weaker Sections (EWS), and Subvention to Support Person-Leaded Individual House Construction. The study mentions the allied industries and their contribution towards the housing sector, with a focus on how they aid the construction and development activities. Based on an analysis of secondary data from different reports and websites, the paper highlights the importance of PMAY in facilitating financial inclusion through instruments such as CLSS, which inspires urban slum dwellers to open bank accounts and avail subsidized loans. The study concludes by

ISSN: 2455-8834

Volume:10, Issue:11 "November 2025"

highlighting opportunities for allied industries to join hands with the housing industry and thereby generate economic growth and enhance the living conditions of the underprivileged segments of society [14].

Another report focuses on the launch of the Credit-Linked Subsidy Scheme (CLSS), under which interest subsidy on home loans is provided to eligible beneficiaries ranging from economically weaker sections of society, low-income groups, and middle-income groups. As of September 2022, around 2.00 crore homes have been built under PMAY-G, and the scheme continues up to March 31, 2024. In addition, the research highlights that PMAY-U has created employment opportunities in nearly 30 different fields, such as plumbing engineering, masonry work and carpentry science, and has employed nearly 1.65 million people through its front of house and back door partnerships in 2020. In May 2020, ARHCs were introduced to provide affordable housing for urban migrants and lower-income groups, as stated in the study. As per the authors, PMAY has made notable progress towards meeting the objective of 'Housing for All' and has been advantageous to various sectors of the economy [15].

Specifically for rural areas, a study examines the impact of the Pradhan Mantri Awas Yojana (PMAY) In-Situ Slum Redevelopment scheme on slum dwellers in India. The scheme aims to provide formal urban settlements to slum dwellers by leveraging the potential of land under slums, offering better housing with essential amenities like water connections, toilet facilities, and 24/7 electricity supply. The authors assess the quality of life of slum dwellers through various indicators, focusing on housing quality, which significantly affects overall well-being. They highlight that poor-quality housing is associated with negative health outcomes, including chronic diseases, injuries, and poor mental health. The paper also discusses the challenges faced in implementing the scheme, such as land acquisition issues and the need for effective monitoring. The authors recommend enhancing transparency, improving the capacity of implementing agencies, and involving beneficiaries in the process to ensure sustainable and habitable housing solutions [16]. Finally, a research was conducted to investigate the role of financial inclusion in facilitating affordable housing in rural India, with a focus on the Pradhan Mantri Awas Yojana (PMAY). The study, based on primary data from 300 respondents in Bilaspur, Chhattisgarh, examines various factors such as kitchen and fuel facilities, water and toilet amenities, employment, income, and the implementation of PMAY. The findings indicate a positive response from beneficiaries towards PMAY, with a high level of satisfaction. The research underscores the importance of integrating financial inclusion strategies to enhance the accessibility and sustainability of housing solutions in rural areas [17].

ISSN: 2455-8834

Volume:10, Issue:11 "November 2025"

1.3. Literature Gap and Rationale of the Study

According to the literature review, most of the existing studies on PMAY have primarily focused on its social impact, implementation difficulties, and housing benefits. Despite this, only limited studies have attempted to determine the direct impact of the economy's contribution to GDP growth, along with other economic indicators. The current literature seems to neglect the quantitative economic impacts of PMAY, particularly in terms of their correlation with GDP performance at the national or state levels. The economic implications of PMAY must be analyzed analytically to address this gap.

This work is noteworthy for its integration of PMAY, a leading housing initiative, with GDP growth and presents supplementary economic data on the scheme, in addition to the customary social and policy-based evaluations. Through the examination of how the scheme influences economic performance, the work offers insights into its contribution to national development. GDP being highlighted makes the issue particularly noteworthy since it gauges the scheme's broader impact, leading policymakers to view PMAY as an economic stimulus tool, rather than just a social welfare initiative.

2. Materials and Methodology

2.1. Research Aim and Objectives

This research aims to analyze the impact of the Pradhan Mantri Awas Yojana (PMAY) on economic growth, i.e., its contribution to State Gross Domestic Product (SGDP). To evaluate this, the following objectives are considered:

- "To assess the impact of PMAY-Rural (PMAY-G) and PMAY-Urban (PMAY-U) on SGDP."
- "To scrutinize the contribution of other socioeconomic factors like health, income, education, and population towards SGDP."
- "To contrast the impacts of rural and urban components of PMAY on economic growth."
- "To provide policy-oriented suggestions to improve PMAY as a welfare and economic growth initiative."

2.2. Research Hypotheses

Null Hypothesis 1: The implementation of Pradhan Mantri Awas Yojana (Urban) has no significant impact on the GDP.

ISSN: 2455-8834

Volume:10, Issue:11 "November 2025"

Null Hypothesis 1: The implementation of Pradhan Mantri Awas Yojana (Rural) has no significant impact on the GDP.

2.3. Data

The research applies panel data in the form of secondary quantitative data, allowing for the examination of a number of entities, namely all Indian states and Union Territories, across a number of time periods. The method captures cross-sectional and temporal variations, thus being suitable in the case of assessing the effect of PMAY (Urban and Rural) on indicators of GDP. The analysis covers all 28 Indian states and 8 Union Territories from the years 2016 to 2022, which is the time frame of the implementation of the PMAY schemes. The data is sourced from the Global Data Lab, PMAY websites, and MoSPI, which offers trustworthy and comparable state indicators for different variables. The variables employed for the study are: SGDP, PMAY Urban (PMAY-U), PMAY Rural (PMAY-G), Gender Development Index, Health Index, Income Index, Education Index, and Population. These variables permit a holistic analysis of the association between housing programs and GDP outcomes.

2.4. Description of Variables

2.4.1 Dependent Variable

- Gross Domestic Product (GDP): Gross State Domestic Product (GSDP) at current prices (Rs. Crores) is considered the indicator of GDP. “SGDP represents the total monetary value of all final goods and services produced within a state’s geographical boundaries.” GDP is employed as a major independent variable since it represents the general economic capacity and level of development of a state, which immediately affects the enforcement and efficacy of the PMAY scheme. States with greater SGDP usually possess more resources, improved infrastructure, and administrative strength to build housing units, offer money, and complete projects on time. Employing SGDP captures the economic potency of the state as an independent variable influencing PMAY outcomes, making the analysis easier while creating a straightforward connection between economic performance and the impact of the scheme [18]. The data for GSDP is extracted from MoSPI.

2.4.2 Independent Variables

- PMAYU (Urban) - Houses sanctioned under the PMAY scheme are used as a proxy indicator to measure its impact in urban areas because they represent the tangible outcomes of the program’s implementation. The number of sanctioned houses reflects both the extent of policy reach and the effectiveness of resource allocation toward

ISSN: 2455-8834

Volume:10, Issue:11 "November 2025"

achieving the scheme's objective of providing affordable housing. The official website of PMAY-Urban has been used to collect data for this indicator.

- PMAYR (Rural) - Similar to urban areas, the number of houses sanctioned in rural regions of the states has been used as a proxy to measure the influence of the PMAY scheme in rural areas. The data for this variable has been collected from the PMAY-Gramin official website.

2.4.3 Controlled Variables

- SGDI - The Gender Development Index (GDI) has been used as a control variable to account for gender-based disparities that may influence economic performance. Since gender equality affects labor force participation, productivity, and human capital formation, controlling for GDI helps isolate the independent impact of other variables on GDP, ensuring more accurate and unbiased results [19].

- Health - The Health Index is a measure of health outcomes such as life expectancy, infant and maternal mortality, and access to minimum health services. It is typically shown on a normalized scale (0 to 1). The Health Index is included as a control variable because better health outcomes contribute to higher productivity and economic growth. A healthier population can work more efficiently and participate more actively in the economy, influencing overall GDP levels [20].

- Income - The Income Index comes from per capita income, often adjusted for purchasing power parity, and is shown as a normalized index value from 0 to 1. The Income Index is controlled for as it reflects the overall standard of living and purchasing power within a state. Higher income levels often drive consumption, investment, and innovation, all of which are key contributors to economic performance [21].

- EDU - The Education Index reflects educational attainment, years of schooling, and literacy levels. It is also expressed as an index ranging from 0 to 1. The Education Index is considered because education enhances human capital, leading to a more skilled and efficient workforce. States with higher education levels are likely to experience stronger economic development due to improved employability and innovation capacity [22].

- POP - Finally, Population is measured in absolute numbers or as population density (persons per square kilometre). Population is included as it directly affects the size of the labor force and consumer base. Variations in population influence both the demand and supply sides of the economy, making it an essential factor to control when analyzing the relationship between other variables and GDP [23].

ISSN: 2455-8834

Volume:10, Issue:11 "November 2025"

2.5 Data Analysis Method

The study is based on panel data covering 36 entities, including 28 states and 8 Union Territories, over the period 2016 to 2022, resulting in multiple observations across time. The dataset initially contained missing values, making it an unbalanced panel. To address this, missing values were estimated using linear interpolation, converting the dataset into a balanced panel suitable for rigorous analysis. All data processing and analysis were performed using STATA 18.

2.5.1 Correlation

Correlation quantifies the strength and direction of a linear relationship between two variables [24]. It is calculated to assess how changes in one variable are associated with changes in another, which is crucial for identifying potential multicollinearity issues in regression analysis. The higher the correlation, the higher the possibility of multicollinearity between the variables. In this study, the correlation coefficients between all independent variables were computed to examine their relationships. Since all correlation values are less than 0.8, there is no high correlation between any of the independent variables, indicating that multicollinearity is not a concern.

Table 1: Correlation Coefficients between Independent Variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) PMAYR	1						
(2) PMAYU	0.448	1					
(3) SGDI	-0.291	-0.286	1				
(4) HEALTH	-0.292	-0.275	0.355	1			
(5) INCOME	-0.152	-0.102	0.643	0.502	1		
(6) EDU	-0.269	-0.296	0.773	0.459	0.795	1	
(7) POP	0.207	0.517	-0.688	-0.458	-0.451	-0.602	1

ISSN: 2455-8834

Volume:10, Issue:11 "November 2025"

2.5.2 Multicollinearity

To validate the correlation results and ensure the reliability of the regression analysis, multicollinearity among the independent variables was assessed. Multicollinearity occurs when two or more independent variables are highly correlated, which can distort the estimation of regression coefficients and reduce the interpretability of the model [25]. It is important to detect and address multicollinearity to ensure that the effects of individual variables on the dependent variable are accurately estimated. In this study, the Variance Inflation Factor (VIF) was used to examine multicollinearity and select the final set of independent variables. The mean VIF value for the framework is 2.693. Since the mean VIF value is below 5, there is no evidence of multicollinearity, supporting the hypothesis that the independent variables are not highly collinear and are suitable for regression analysis.

2.5.3 Model Specification

The study uses panel data to analyse the objectives. Accordingly, a panel regression framework has been developed based on the available data. The following equation represents the panel regression model, illustrating the relationship between various independent variables and the rate of female entrepreneurship.

$$GDP_{it} = \beta_0 + \beta_1 PMAYR_{it} + \beta_2 PMAYU_{it} + \beta_3 SGDI_{it} + \beta_4 HEALTH_{it} + \beta_5 INCOME_{it} + \beta_6 EDU_{it} + \beta_7 POP_{it} + e$$

Wherein, β_0 is the intercept coefficient, β_n are the respective slope coefficients (n = 1,2,3,4,5,6,7), i is the cross-section (states), t is the time period (year), and e is the error term.

When analyzing panel data, several econometric techniques can be applied, such as fixed effects, random effects, and pooled OLS models [26]. The Fixed Effects model accounts for time-invariant characteristics of each state or Union Territory by allowing each entity to have its own intercept, making it suitable when unobserved individual-specific effects may be correlated with the independent variables. Its regression equation is:

$$Y_{it} = \alpha_i + \beta X_{it} + \varepsilon_{it},$$

where Y_{it} is the dependent variable, X_{it} represents independent variables, α_i captures entity-specific effects, and ε_{it} is the error term. The Random Effects model assumes that entity-specific effects are random and uncorrelated with the independent variables, suitable when individual effects are randomly distributed. Its equation is:

$$Y_{it} = \alpha + \beta X_{it} + u_i + \varepsilon_{it},$$

ISSN: 2455-8834

Volume:10, Issue:11 "November 2025"

where u_i represents the random entity-specific effect. Pooled Ordinary Least Squares ignores the panel structure and treats all observations as a simple cross-section, applicable when individual heterogeneity is negligible. These models are used to estimate the impact of PMAY (Urban and Rural) and other independent variables on GDP indicators, with the choice of the appropriate model guided by statistical tests such as the Hausman test and Breusch Pagan Lagrange Multiplier Test.

2.5.4 Hausman Test

The Hausman test is used to determine whether the Fixed Effects or Random Effects (or POLS) model is more appropriate for panel data analysis [27]. It tests whether the unique errors (entity-specific effects) are correlated with the independent variables. The null hypothesis of the Hausman test states that the preferred model is Random Effects or POLS, meaning the entity-specific effects are not correlated with the regressors. In this study, the Hausman test was conducted to select the appropriate model for estimating the impact of PMAY (Urban and Rural) on GDP. Since the p-value (0.059) was greater than 0.05, the null hypothesis could not be rejected, indicating that the Random Effects model or POLS model is appropriate. Additionally, for comparing Random Effects with Pooled OLS, the Breusch-Pagan LM test is conducted.

2.5.5 Breusch pagan LM test

The Breusch-Pagan Lagrange Multiplier (LM) test is used to decide between the Random Effects model and Pooled Ordinary Least Squares (POLS) when panel data is considered [28]. The test examines whether the variance of the unobserved individual-specific effects is zero. The null hypothesis of the Breusch-Pagan LM test states that the variance of the random effects is zero, implying that Pooled OLS is appropriate. In this study, the Breusch-Pagan LM test was conducted to select between Random Effects and POLS for analyzing the impact of PMAY (Urban and Rural) on GDP. The p-value (0.000) was found to be less than 0.05, leading to the rejection of the null hypothesis and confirming that the Random Effects model is more appropriate than pooled OLS. Therefore, the diagnostics are run for the random effects model.

2.6. Diagnostics

2.6.1 Autocorrelation

Autocorrelation occurs when the error terms in a panel data model are correlated across time periods [29]. Testing for autocorrelation is important because its presence can lead to biased and inefficient standard errors, affecting the validity of regression results. Thus, identifying autocorrelation is essential to ensure appropriate adjustments, such as using robust standard errors, for reliable inference. In this study, the Wooldridge test for autocorrelation in panel data

ISSN: 2455-8834

Volume:10, Issue:11 "November 2025"

was applied to detect autocorrelation. The null hypothesis states that there is no first-order autocorrelation in the errors. The test results yielded a p-value (0.000) less than 0.05, leading to the rejection of the null hypothesis and indicating the presence of autocorrelation in the model.

2.6.2 Heteroskedasticity

Heteroskedasticity refers to the condition in which the variance of the error terms in a regression model is not constant across observations [30]. Testing for heteroskedasticity is important because its presence can lead to inefficient and biased estimates, making standard errors unreliable and affecting hypothesis testing. In this study, heteroskedasticity in the Random Effects model was assessed using the log-likelihood test, the Lagrange Multiplier test, and the Wald test. The null hypothesis for these tests states that the variance of the errors is constant (or homoskedastic). The results for all the tests showed p-values (0.000, for all tests) less than 0.05, leading to the rejection of the null hypothesis and indicating the presence of heteroskedasticity.

2.6.3 Correction for Autocorrelation and Heteroskedasticity

To correct for both heteroskedasticity and autocorrelation in the Random Effects model, the Feasible Generalized Least Squares regression was employed. FGLS is an estimation technique that produces efficient and unbiased parameter estimates by adjusting for heteroskedasticity and serial correlation in the error terms, ensuring more reliable inference and accurate standard errors.

3. Results

3.1 Descriptive Analysis

Table 2: Descriptive Statistics of the Variables

Variable	Mean	Std. Dev.	Min	Max
GDP	551953.76	618636.87	5664	3144138
PMAYR	145376.95	246190.13	0	1106780
PMAYU	24192.369	50475.937	1	299074
SGDI	0.854	0.028	0.777	0.919
HEALTH	0.791	0.039	0.692	0.883

ISSN: 2455-8834

Volume:10, Issue:11 "November 2025"

INCOME	0.658	0.062	0.502	0.761
EDU	0.582	0.066	0.456	0.732
POP	38565.112	49995.15	69.156	240069.14

Table 2 demonstrates the descriptive statistics of the final variables considered in the model. The results indicate that Indian states display sharp economic and demographic disparities, with GDP ranging from as low as ₹5,664 crores to as high as ₹3,144,138 crores (mean = ₹551,953.76 crores; SD = ₹618,636.87 crores), reflecting deep inequality in state-level income generation. Government housing program, PMAY, also shows wide variation, as PMAYR ranges from 0 to 1,106,780 houses sanctioned (mean = 145,376.95; SD = 246,190.13) and PMAYU from 1 to 299,074 houses sanctioned (mean = 24,192.37; SD = 50,475.94), suggesting uneven distribution between states and between rural and urban beneficiaries. By contrast, the social development indices demonstrate more stability: SGDI (0.777–0.919), HEALTH (0.692–0.883), INCOME (0.502–0.761), and EDU (0.456–0.732) all show relatively narrow ranges, indicating moderate differences across states in social dimensions compared to the economy and housing schemes. Population size exhibits the highest demographic variation, from just 69,156 to 240,069,140 (mean = 38,565,110; SD = 49,995,150), amplifying the uneven demand for resources and policy interventions. Collectively, these numbers highlight that while social indicators are comparatively stable, wide gaps in economic performance, housing benefits, and population distribution necessitate more targeted and region-specific policies for balanced development.

3.2 Regression Analysis

Table 3 - FGLS regression Results

GDP	Coef.	St.Err.	t-value	p-value	[95% Confidence Interval]		Sig
PMAYR	0.04	0.094	0.43	0.666	-0.143	0.224	
PMAYU	4.124	0.591	6.98	0	2.966	5.281	***
SGDI	4213904.6	1238257.9	3.4	0.001	1786963.7	6640845.6	***
HEALTH	898499.58	647271.58	1.39	0.165	-370129.41	2167128.6	

ISSN: 2455-8834

Volume:10, Issue:11 "November 2025"

INCOME	1976631.5	523978.33	3.77	0	949652.83	3003610.1	***
EDU	249635.99	575196.21	0.43	0.664	-877727.86	1376999.8	
POP	14.194	0.817	17.38	0	12.593	15.795	***
Constant	-5846380.9	1108862.6	-5.27	0	-8019711.6	-3673050.2	***

Mean dependent var	474009.381	SD dependent var	603514.683	
Number of obs	176	Chi-square	848.417	
Prob > chi2	0	Akaike crit. (AIC)	4889.763	

**** p<.01, ** p<.05, * p<.1*

Table 3 shows the results for the regression model considering GDP as the dependent variable. The regression results highlight the significance of different predictors of GDP. The coefficient of PMAYR is 0.04 with a p-value of 0.666, which is statistically insignificant, indicating that the number of houses sanctioned through PMAY in rural areas does not have a meaningful effect on GDP. In contrast, PMAYU is highly significant ($p < 0.001$), with a coefficient of 4.124, suggesting that for every additional unit increase in houses sanctioned in urban areas through the PMAY scheme, State GDP significantly increases by Rs. 4.12 crores. Moreover, the results indicate that GDP is strongly influenced by the other three key variables: SGDI, INCOME, and POP. Specifically, improvements in the state gender development index (SGDI1) lead to the largest positive impact, with a one-unit increase associated with an average rise of about Rs. 4213904.6 crores in GDP, while higher income levels (INCOME1) also play a critical role, contributing nearly Rs. 1976631.5 crores to GDP per unit increase. In addition, population growth (POP1) significantly boosts GDP, with each unit increase linked to an additional Rs. 14.19 crores in output, reflecting the contribution of a larger workforce and greater aggregate demand. Together, these findings highlight that broader social development, rising incomes, and population expansion are statistically robust drivers of economic growth. Finally, HEALTH and EDU do not have a significant impact on driving GDP in India. The overall model is statistically

ISSN: 2455-8834

Volume:10, Issue:11 "November 2025"

significant (Chi-square = 848.417, $p < 0.001$), confirming the robustness of the regression results.

4. Discussion

PMAY in rural areas, also known as PMAY-G, has a limited direct effect on SGDP (State Gross Domestic Product) because the financial assistance provided is relatively small compared to the overall state economy. While the scheme does boost local employment and demand for construction materials, these effects are often too localized and small-scale to significantly move the needle on a state's entire GDP. The scheme's main purpose is to improve the socio-economic conditions of individual rural households, not to act as a major driver of large-scale economic growth [31]. The primary impact of PMAY-G is on poverty alleviation, improved living standards, and social empowerment, rather than on macro-level economic indicators [32]. Hence, PMAY has a negligible impact on GDP directly.

Supported by a variety of research papers and official reports, PMAY in urban areas affects SGDP due to the significant multiplier effect of the construction sector. The program's focus on building 'pucca' houses in cities drives demand for a wide range of goods and services, including steel, cement, and other raw materials, which boosts manufacturing and ancillary industries on a large scale [33, 34]. This increase in economic activity is further amplified by the creation of both skilled and unskilled jobs in construction, leading to higher household incomes and increased consumer spending [35]. As a result, the scheme has a multidimensional impact on state economies, contributing not only to physical infrastructure development but also to overall economic growth in urban regions [32].

Subsequently, this research demonstrates that population dynamics significantly impact India's economic growth through multiple mechanisms. India's population growth has contributed positively to GDP growth, with studies showing that economic growth would have been lower without population increases [36]. The country's demographic transition presents unique opportunities, as India contains nearly 18% of the global population and is expected to surpass China as the most populous nation, though it ranks poorly in per capita income metrics [37]. The relationship between population composition and economic performance is particularly important. Countries with higher age dependency ratios tend to have lower per capita GDP, while India's current demographic structure - with a larger working-age population relative to dependents - creates favorable conditions for economic growth through demographic dividend [38]. Moreover, as found by the study, an equitable split of gender and gender development also affects economic growth positively. However, population growth also correlates with increased economic inequality, as evidenced by positive correlations between GDP, population, and crime rates, suggesting unequal income distribution remains a challenge [39]. Lastly, income index and

ISSN: 2455-8834

Volume:10, Issue:11 "November 2025"

purchasing power directly and strongly determine GDP. The evidence spans over four decades with robust statistical support. A study provides the strongest evidence, showing per capita income emerged as one of the strongest contributors to GDP growth from 1990-2024, with their regression model explaining 96% of GDP variations [40]. Similarly, other researchers found a strong positive correlation between GDP per capita and economic growth indicators using data from 1980-2022, with their model explaining 83.4% of the variation in economic performance [41]. It has been confirmed by another study that there exists a strong correlation between GDP growth and per capita income over 2000-2020 using multiple statistical tests, including ANOVA and Granger Causality tests [42]. Finally, S. Seshaiah et al. [43] found evidence of long-run cointegrating relationships between GDP PPP per capita and economic variables across BRICS nations, including India. The consistency across different time periods, methodologies, and high explanatory power (83-96%) indicates very strong empirical support for this positive relationship.

5. Conclusion

This research analyzed how the Pradhan Mantri Awas Yojana (PMAY) influenced the economic growth of India, specifically its contribution to State Gross Domestic Product (SGDP). The study assessed the implications of PMAY-Rural (PMAY-G) and PMAY-Urban (PMAY-U) on SGDP and other socioeconomic indicators like income, health, education, population, and gender development. Panel data for 28 states and 8 Union Territories between 2016–2022 were estimated using Feasible Generalized Least Squares to correct for autocorrelation and heteroskedasticity. Analysis revealed that houses sanctioned through PMAY in urban areas have a positive and significant effect on SGDP, while houses sanctioned through PMAY in rural areas do not have a significant direct influence. Population, income index, and gender development index are significant positive determinants of SGDP, while the health and education indices are not statistically significant in influencing SGDP. The existing studies show that the Pradhan Mantri Awas Yojana (PMAY) has a multi-dimensional role to play in India's growth. In rural regions, PMAY Rural works mostly in enhancing household living conditions by ensuring that people have stable shelter, which enhances their health, security, and dignity. It also alleviates poverty by ensuring financial inclusion and empowering marginalized communities through property ownership rights, particularly for women. Conversely, PMAY Urban triggers urban economic development through the induction of high-scale construction activity to generate jobs and stimulate related industries like cement, steel, and real estate. So, PMAY becomes not just a social welfare scheme of bringing up poor families but also an economic growth catalyst, indicating how housing schemes can create social and economic value throughout regions.

ISSN: 2455-8834

Volume:10, Issue:11 "November 2025"

6. Policy Implications

The findings of this study have important policy implications for governments, policymakers, and NGOs. For the government, the significant positive impact of PMAY-Urban on SGDP suggests that investing in urban housing can stimulate economic growth through job creation, construction demand, and development of allied industries, while PMAY-Rural's limited direct impact highlights the need to integrate housing with livelihood and income-generating programs. Policymakers can use these insights to design differentiated strategies, scaling up urban projects with private sector participation and implementing integrated rural development approaches that combine housing with education, healthcare, and skill development, while refining PMAY-Gramin through local material procurement, livelihood linkages, and asset formalization so that rural housing not only provides shelter but also generates jobs, stimulates MSMEs, unlocks credit, and thereby contributes directly to GDP growth. NGOs can leverage the results to conduct awareness campaigns, educating communities about scheme benefits, proper loan utilization, and participation in development initiatives, thereby enhancing both social and economic outcomes. Overall, the study underscores the potential of PMAY as a tool for inclusive economic growth and evidence-based policy planning.

7. Limitations

The study has several limitations that should be considered when interpreting the results. First, while comparisons were made between states, variations in administrative efficiency, local governance, and implementation capacity may influence the effectiveness of PMAY, potentially affecting the observed impact on SGDP. Second, macroeconomic events such as inflation, economic slowdowns, or policy changes during 2016–2022 were not explicitly accounted for, which could have influenced state-level economic performance independently of the housing schemes. Third, the study relies on secondary data, which may not fully capture informal housing activities, unreported construction, or local-level socioeconomic changes, possibly underestimating the true effects of PMAY on economic growth.

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ISSN: 2455-8834

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