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Towards a Digital Revolution: Investigating the Impact of GDP, Tax Collection, and Interest Rates on Cashless Economy in India

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Abstract

The rapid advancement of digital technologies have propelled economies worldwide towards a transformative shift to cashless transactions. In the context of India's ambitious journey towards a digital revolution, this research aims to investigate the impact of Gross Domestic Product (GDP), tax collection, and interest rates on the adoption and usage of a cashless economy in India. The objectives of the study were to explore the relationships between GDP and the cashless economy, tax collection and the cashless economy, and interest rates and the cashless economy. Three hypotheses were formulated to test these relationships, positing that as GDP, tax collection, and interest rates increase, the adoption and usage of cashless payment methods in India. Using OLS multiple regression analysis through STATA software, data from the years 2001 to 2020 were meticulously analyzed. The research findings revealed a significant positive correlation between GDP and the cashless economy, indicating that as India's economy grows, there is an increased inclination towards digital payment methods. Similarly, effective tax collection initiatives were found to play a pivotal role in promoting formal financial transactions and driving the adoption of cashless payments in the country. However, contrary to the hypothesis, the study results showed that the impact of interest rates on cashless payment adoption was not as prominent as anticipated. This research contributes valuable insights into the dynamics of India's digital revolution, emphasizing the role of key macroeconomic factors in shaping the cashless ecosystem. The findings offer strategic implications for policymakers, financial institutions, and businesses in devising evidence-based strategies to accelerate India's transition towards a robust and inclusive cashless economy.

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Keywords: cashless economy, digital revolution, GDP, tax collection, interest rates, OLS multiple regression analysis, India.

Introduction

The global economy has been undergoing a remarkable transformation with the advent of cashless payment systems. India, as a rapidly growing economy, has recognized the potential benefits of embracing a cashless model to bolster economic growth and foster financial inclusion. As the nation strives towards becoming a digital economy, understanding the relationships between key macroeconomic indicators - Gross Domestic Product (GDP), tax collection, interest rates, and the adoption of cashless payment methods - is crucial to formulate effective policies and drive sustainable economic development (Tran et al., 2023; Tee & Ong, 2016). The adoption of cashless payment methods has been associated with positive impacts on economic growth, where Economy that make the switch to digital tend to experience higher growth rates (Kamlesh, 2017). Research conducted by BCG has revealed that transitioning to a cashless model could boost a country's annual GDP by up to 3 percentage points. Conversely, cash-based economies tend to miss out on significant opportunities in the global commercialization landscape and may experience slower economic growth (Massi et al., 2019).

However, it is important to note that the impact of adopting cashless payment methods on economic growth is a phenomenon that becomes significantly observable in the long run. The advantages of going cashless, coupled with advancements in innovative technologies, have accelerated the journey toward a cashless society (Kamlesh, 2017). The ongoing transition from cash-based to cashless payment methods and the development of digital Economy have been explored in various studies, reaffirming the potential long-term benefits of embracing cashless transactions (Tee & Ong, 2016). The relationship between tax collection and the adoption of cashless payment methods is a crucial aspect that demands attention. In developing Economy like India, low levels of tax compliance have been a major constraint on revenue collections. Embracing cashless payment methods can enhance tax collection capabilities, as digital transactions are easier to track and monitor, reducing opportunities for tax evasion and increasing overall compliance. The resulting increased tax revenue can be utilized to fund welfare programs and initiatives that further stimulate economic growth (Bourreau et al., 2018; Garg & Panchal, 2017; Das et al., 2023)

The role of interest rates cannot be understated in influencing consumer behavior and investment patterns. Fluctuations in interest rates can affect borrowing costs, spending

patterns, and saving behavior, all of which impact the adoption and usage of digital payment platforms. A favorable interest rate environment could encourage consumers and businesses to opt for digital payments, while high-interest rates might promote cash usage as a means of evading transaction costs (Massi et al., 2019; Simon Oyewole et al., 2013).

Several studies have examined the positive correlation between cashless payments, tax collection, and economic growth. Researchers like Zandi found that cashless payments lead to an upsurge in private consumption, contributing to GDP growth (Zandi et al., 2016). Additionally, studies by Tran have demonstrated a direct link between the growth of e-payments and overall economic expansion (Tran et al., 2023). As India moves forward in its quest to embrace a digital economy, the impact of GDP, tax collection, and interest rates on the cashless ecosystem needs to be carefully analyzed. This research paper aims to provide a comprehensive understanding of these relationships by examining existing literature, empirical data, and statistical analyses. The findings from this study will offer valuable insights to policymakers and stakeholders, assisting them in formulating evidence-based strategies to accelerate India's transition towards a robust and inclusive cashless economy. As India continues to march towards a cashless future, this research endeavor aims to shed light on the impact of GDP, tax collection, and interest rates on the adoption and expansion of digital payment systems. Insights derived from this study can be instrumental in formulating evidence-based policies that drive financial inclusion, efficiency, and transparency within the Indian economy. Embracing a cashless economy has the potential to unlock numerous benefits for India, and this research seeks to contribute to the knowledge base required for effective decision-making in this transformative journey.

Objectives

- To find the Relationship between GDP and Cashless economy.
- To find the Relationship between Tax Collection and cashless economy.
- To find the Relationship between Interest rates and cashless economy.

Hypothesis

(H1). *As GDP increases, the adoption and usage of cashless payment methods in the economy will also increase in India.*

- (H2).** *As Tax collection increases, the adoption and usage of cashless payment methods in the economy will also increase in India.*
- (H3).** *As Interest rate increases, the adoption and usage of cashless payment methods in the economy will also increase in India.*

Literature Review

The cashless economy pertains to an economic structure where a significant proportion of transactions occur electronically, eliminating the use of physical cash. Extensive research has been conducted to explore the correlation between GDP and the adoption of cashless payment methods, revealing various positive and negative effects. Embracing electronic payment systems can drive a transition towards a cashless society, presenting opportunities for favorable impacts on economic activities (Simon Oyewole et al., 2013). A recent study conducted in Nigeria revealed a substantial and encouraging link between the e-payment system and the country's development, as evidenced by real GDP per capita and per capita commerce (Khan, 2022). These findings indicate that integrating cashless payment methods can play a vital role in fostering economic growth and development. Moreover, reaching a significant level of development in cashless transaction systems can result in cost reductions linked to cash circulation and storage (Kulisz et al., 2021). The cost reduction achieved through such measures can positively influence GDP by enhancing the overall efficiency and productivity of the economy. Additionally, the advent of mobile payment services is anticipated to have a substantial effect on the economy, streamlining and expediting payment processes (Mints et al., 2022). Conversely, there exist apprehensions surrounding the privacy and security aspects of online payment systems, potentially undermining trust in these systems (Maduwansha & Boyagoda, 2022). In the context of India, the correlation between GDP and cashless transactions showed a low and negative relationship, whereas, in Saudi Arabia, it exhibited a high and positive correlation. These findings imply that the influence of GDP on cashless transactions can differ significantly based on the specific economic context of each country. Additionally, the research revealed that the relationship between economic growth and cashless transactions varies among different countries (Maduwansha & Boyagoda, 2022). Another study looks at how India is shifting towards a cashless economy and what factors influence this change. The study identifies what helps and hinders the adoption of cashless payments. It finds that having money flowing into accounts is a significant factor driving the move towards digital transactions (Mukhopadhyay, 2016).

Research indicates that a cashless economy offers significant advantages concerning tax collection. The adoption of electronic payment systems enables governments to track transactions more efficiently, reducing the potential for tax evasion. Additionally, these systems provide a transparent trail of financial transactions, enabling tax authorities to identify discrepancies or underreporting of income with greater ease. As a consequence, tax collection becomes more precise and efficient, leading to a rise in government revenue. Ultimately, the move towards a cashless economy can contribute to better fiscal management and improved public services (Remige, 2020). Evidence from European data suggests that cashless payments play a significant role in curbing tax evasion by establishing a transparent trail for transactions. Empirical findings reveal a negative correlation between credit and debit card payments and VAT evasion, further reinforcing this claim. However, the study also uncovers that the use of electronic cards to withdraw cash at ATMs, by increasing the availability of cash, can facilitate VAT evasion (Immordino & Russo, 2018).

The adoption of non-cash transactions offers significant benefits to governments, particularly in terms of accurate tax collection and improved financial transparency (Yakean, 2020). By conducting most financial transactions through digital systems and storing data in computer networks, authorities gain the ability to track irregularities, thus enhancing local government revenues. This shift towards a cashless society can also play a crucial role in combating fraud, tax evasion, and tax avoidance, which tend to be more prevalent with cash payments (Tade & Adeniyi, 2020). Furthermore, non-cash transactions have a positive impact on various aspects of the economy. They support the growth of small-micro businesses and e-commerce, resulting in increased local taxes (Yakean, 2020). The implementation of non-cash levies, such as for parking, public transport services, garbage retribution payments, and excavation fees, can further bolster local revenue. Moreover, banking transactions facilitate easy currency exchange for international transactions. Another noteworthy advantage of embracing a cashless system is the potential to curb corruption. By enforcing cashless methods, there is a sophisticated approach to reduce the likelihood of accepting bribes and eliminate the circulation of counterfeit money (Ridwan et al., 2022).

The interest rate plays a crucial role in shaping the cashless economy. When interest rates are high, it can act as an incentive for people to hold onto cash rather than keeping money in digital payment systems. This preference for holding cash may reduce the adoption of cashless transactions as it becomes more costly to borrow money or use credit cards. On the other hand, lower interest rates can encourage individuals and businesses to opt for

cashless payment methods as the cost of borrowing decreases, making digital transactions more attractive, researchers found that electronic money usage has a significant negative effect on inflation, while debit card usage has a significant positive impact. Credit card usage showed an insignificant negative effect, and the interest rate variable had a significant positive impact (Muslikhati & Aprilianto, 2022). Cashless payment records play a crucial role in shaping a firm's access to financing. With accurate and reliable cashless transaction records, the firm is more likely to secure loans with lower interest rates. Transparent financial data from cashless transactions builds lender confidence, reducing perceived risk and improving loan terms. Additionally, a solid cashless payment history can enhance the firm's credit score, opening doors to more competitive financing options. Investors also find companies with robust cashless transaction records appealing, signaling financial responsibility and growth potential. Emphasizing cashless transactions can thus lead to improved financial opportunities and stability for the firm (Ghosh et al., 2021).

As India ventures into the realm of a dynamic digital economy, the profound influence of GDP, tax collection, and interest rates on the thriving cashless ecosystem demands the attention. The research can embark on a journey to unravel the intricate connections between these key factors, drawing insights from a rich array of existing literature, empirical data, and statistical analyses. As the tapestry of knowledge unfolds, policymakers and stakeholders will be captivated by the invaluable revelations, empowering them to craft evidence-based strategies that accelerate India's transition towards a vibrant and all-encompassing cashless economy.

Methodology

The model specification used in this study (section 2) is a linear regression model. In this study, the model refers to the regression model used to investigate the relationship between the dependent variable (cashless) and independent variables (GDP, tax, and inflation). The model is a multiple linear regression model that aims to examine the impact of macroeconomic factors on the adoption of cashless transactions. Specifically, the model specification includes the intercept and three predictor variables. The coefficients of the predictor variables are estimated by the method of ordinary least squares (OLS) regression to obtain the fitted regression equation. The model is used to analyze the relationship between cashless transactions and macroeconomic factors and to make predictions about the adoption of cashless transactions based on changes in the predictor variables.

Based on the OLS regression Analysis, the following model is used to estimate the relationship between the Dependent and independent variables:

The general formula for the regression model used in this study is:

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \varepsilon \dots \dots \dots (I)$$

Where, Y represents the dependent variable, x_1 , x_2 , and x_3 , represent the independent variables (GDP, Tax, Inflation in this case), β_0 represents the intercept, β_1 , β_2 , and β_3 represent the coefficients for the independent variables, and ε represents the error term.

So, in this specific case, the model of the study is written as:

$$\text{Cashless economy} = \beta_0 + \beta_1(\text{GDP}) + \beta_2(\text{tax}) + \beta_3(\text{inflation}) + \varepsilon \dots \dots \dots (II)$$

where,

Cashless represents = the adoption of a cashless economy as the dependent variable, measured as a percentage of total transactions made without the use of physical cash.

GDP = represents the gross domestic product as an independent variable, a measure of the economic activity of a country.

Tax = represents the tax collection as an independent variable, Tax collection refers to the tax revenue collected via transactions in a cashless economy.

Inflation = represents the inflation rate as an independent variable, inflation refers to the rate of inflation in the country

β_0 , β_1 , β_2 , and β_3 = are the coefficients of the regression model.

ε = represents the error term.

To estimate the model parameters, ordinary least squares (OLS) regression analysis was conducted. This method of analysis was chosen because it is a commonly used and well-established method for estimating the parameters of a linear regression model. The objective of the OLS method is to minimize the sum of the squared residuals between the observed and predicted values of the dependent variable. the model specification includes the intercept and the three predictor variables. Ordinary least squares (OLS) to obtain the fitted regression equation. Data were analyzed in Stata software. Data were available on aggregate/ national level only for 20 years from 2001 to 2020 however the analysis requires more than 30 years ($n > 30$). Hence, the study do interpolation of annual data into quarterly data i.e., 20 years $\times 4 = 80$ quarterly data using Stata software. The Data was collected from official Government websites and Departments such as the Reserve Bank of India, the Income Tax Department of India, the World Bank, and the IMF.

Results and Discussion

Multiple OLS Regression Analysis

The purpose of this section is to analyze the macroeconomic factors influencing the adoption of a cashless economy in India. This analysis utilizes multiple regression analysis, specifically the ordinary least squares (OLS) method, to examine the relationship between the independent variables (tax, inflation, and GDP) and the dependent variable (adoption of a cashless economy). The OLS regression analysis allows for the identification of significant predictors of cashless adoption, as well as the strength and direction of their relationship. The findings of this analysis will provide insights into the macroeconomic factors that are critical to the successful adoption of a cashless economy in India and can help guide policy decisions related to promoting this transition.

Table 1 presents the results of the OLS regression analysis of the relationship between cashless transactions and GDP, taxes, and inflation. The intercept term (constant) was found to be -698,828,541 (SE=516,504,744, t=-1.35, p=0.18), which indicates that the predicted cashless transactions value when all predictor variables are zero is negative. GDP had a positive coefficient of 6,247,428 (SE=291,688, t=21.42, p<0.001), indicating that for each unit increase in GDP, cashless transactions increase by 6,247,428 units. The tax also had a positive coefficient of 89.22 (SE=18.21, t=4.90, p<0.001), indicating that for each unit increase in tax, cashless transactions increase by 89.22 units. Inflation had a negative coefficient of -865,863,329 (SE=57,895,924, t=-14.96, p<0.001), indicating that for each unit increase in inflation, cashless transactions decrease by 865,863,329 units.

Table 1 Regression Coefficients

Predictor	Coefficient	SE Coefficient	T	P
Constant	-699E ⁰⁸	516504744	-1.35	0.180
GDP	6247428	291688	21.42	0.000
Tax	89.22	18.21	4.90	0.000
Inflation	-8066E ⁰⁸	57895924	-14.96	0.000

Source: Regression Analysis output from STATA

Table 1. Regression coefficients, the values of the OLS multiple regression model which is shown below.

$$\text{Cashless economy} = \alpha_0 + \alpha_1(\text{GDP}) + \alpha_2(\text{tax}) + \alpha_3(\text{inflation}) + \epsilon$$

$$\text{Cashless economy} = -6.99\text{E}+08 + 6247428 \text{ GDP} + 89.2 \text{ Tax} - 8.66\text{E}+08 \text{ Inflation}.$$

The equation is a multiple linear regression model, which shows the relationship between the Cashless economy variable and its predictors (GDP, Tax, and Inflation). The regression model estimates the expected value of a cashless economy as a function of the predictor variables, with the coefficients representing the strength and direction of their association.

The equation indicates that the constant term for the cashless economy is $-6.99\text{E}+08$ (i.e., -699 million). The coefficient of GDP is 6.247 million, which suggests that for each unit increase in GDP, the cashless economy is expected to increase by 6.247 million, holding all other variables constant. The coefficient of Tax is 89.2, which indicates that for each unit increase in Tax, the cashless economy is expected to increase by 89.2 units, holding all other variables constant. Finally, the coefficient of Inflation is $-8.66\text{E}+08$ (i.e., -866 million), which suggests that for each unit increase in Inflation, the Cashless economy is expected to decrease by 866 million, holding all other variables constant.

Estimation of Model fit Statistics

Table 2. provides the statistical summary of the OLS regression model for the relationship between the cashless economy and its predictors (GDP, Tax, and Inflation). The value of S (standard error of the regression) is 1331747189, which is a measure of the average distance that the observed data points fall from the regression line.

The R-squared value is 0.953, indicating that approximately 95.3% of the variation in the cashless economy can be explained by the predictors (GDP, Tax, and Inflation) included in the model. This is a high value and suggests that the model provides a good fit to the data. The adjusted R-squared value is 0.952, which takes into account the number of predictors in the model. It is only slightly lower than the R-squared value due to the small number of predictors in the model. These statistics provide evidence that the model is a good fit for the data and that the predictors (GDP, Tax, and Inflation) included in the model have a significant impact on the cashless economy.

Table 2. Estimation of Model Fit

R Square	Adjusted R square	Std. Error of the Estimate
95.5%	95.2%	1331747189

Source: Regression Analysis output from STATA

Analysis of Variance (ANOVA)

The analysis of variance (ANOVA) in Table 3 is used to test the overall significance of the regression model. It provides information on the sources of variation in the data and the extent to which these sources contribute to the variation in the dependent variable. Table 3 shows the regression source has three degrees of freedom, indicating that there are three independent variables in the model. The sum of squares for the regression source is 2.76045E+21, indicating that the independent variables explain a large amount of the variation in the dependent variable. The mean square for the regression source is 9.20150E+20, indicating that the independent variables have a significant impact on the dependent variable. The F-statistic is 518.82, with a p-value of 0.000, indicating that the model is significant and that at least one of the independent variables has a significant impact on the dependent variable. The Residual Error source has 76 degrees of freedom, indicating that there are 76 observations in the data that are not explained by the model. The sum of squares for the residual error source is 1.34790E+20, indicating that there is still some unexplained variation in the dependent variable. The mean square for the residual error source is 1.77355E+18. The total source has 79 degrees of freedom, indicating that there are 79 observations in the data. The sum of squares for the Total source is 2.89524E+21, which is the sum of the (sum of squares) for the Regression and Residual Error sources. The ANOVA table indicates that the OLS multiple linear regression model is significant, with the independent variables collectively explaining a large amount of the variation in the dependent variable. The F-statistic and p-value indicate that at least one of the independent variables has a significant impact on the dependent variable. However, there is still some unexplained variation in the dependent variable, as indicated by the sum of squares for the residual error source.

Table 3. Analysis of Variance (ANOVA)

Source	DF	SS	MS	F	P
Regression	3	2.76045E+21	9.20150E+20	518.82	0.000
Residual Error	76	1.34790E+20	1.77355E+18		
Total	79	2.89524E+21			

Source: Appendix A. Regression Analysis output from STATA

Sequential Sum of Squares

Table 3. shows the sequential sums of squares (Seq SS) and degrees of freedom (DF) for each predictor variable (GDP, Tax, and Inflation) in a regression model. The sequential sum of squares represents the portion of the total sum of squares that is explained by each predictor variable in the order they were entered into the model. For example, the sequential sum of squares for GDP shows the amount of variation in the dependent variable (presumably adoption of a cashless economy) that is explained by GDP, after accounting for the variation explained by any previous predictor variables in the model. The "Seq SS" column shows the amount of variability in the dependent variable that is explained by each predictor variable, in sequence. It indicates the amount of unique variance in the dependent variable that is accounted for by each predictor variable, after controlling for the other predictor variables in the model. The degrees of freedom (DF) represent the number of independent pieces of information that went into estimating the parameter for each predictor variable. In this case, each predictor has one degree of freedom because there is only one coefficient being estimated for each variable.

Table, 3. can see that GDP explains most of the variation in the dependent variable, with a much larger Seq SS value than the other two predictor variables. Inflation explains more variation than Tax, with a Seq SS value that is almost 7 times larger. Overall, these results suggest that GDP is the strongest predictor of the adoption of a cashless economy, followed by Inflation and then Tax in an OLS multiple linear regression model.

Table 4. Sequential Sum of Squares

Source	DF	Seq SS
GDP	1	2.30631E+21
Tax	1	5.74581E+19
Inflation	1	3.96685E+20

Source: Appendix A. Regression Analysis output from STATA

Unusual Observations

Table 4. shows the unusual observations in the dataset for the given variables of GDP and Cashless adoption. Unusual observations refer to the data points that are significantly different from the other observations in the dataset, and it is important to identify them as they can potentially affect the results of the analysis.

Table 4. provides information on four observations (45, 78, 79, and 80) that are considered unusual based on their standardized residuals and leverage values. Standardized residuals are the residuals that are standardized based on their variance and provide an indication of how far the data point is from the predicted value. Leverage values, on the other hand, are measures of how much an observation deviates from the mean of the predictor variable. Observation 45 has a large negative standardized residual value of $-2.25R$, which indicates that the actual value for cashless adoption is significantly lower than the predicted value based on the regression model. Observation 45 also has a leverage value within an acceptable range, which means that the deviation is not due to an extreme value of GDP. Observations 78, 79, and 80 have large positive leverage values, indicating that they have extreme values of GDP compared to the other observations in the dataset. These observations have relatively smaller standardized residual values, which suggests that the Cashless adoption values for these observations are closer to the predicted values than observation 45. However, these observations may still have an impact on the overall model fit due to their large leverage values.

Table 5. Unusual Observations

Obs.	GDP	Cashless eco.	Fit	SE Fit	Residual	St. Resid
45	1828	301200000	3250662562	248180028	-2949462562	-2.25R
78	2627	13633410816	13889962133	560586993	-2949462562	-0.21 X
79	2586	13118304768	13471094542	671974037	-352789774	-0.31 X
80	2545	12603198720	13138188540	787306425	-534989820	-0.50 X

Source: Appendix A. Regression Analysis output from STATA

R denotes an observation with a large standardized residual.

X denotes an observation whose X value gives it large leverage.

Discussion

This study focuses on the macroeconomic perspective of the cashless economy in India. It explores the impact of three independent variables – tax collection, inflation, and GDP - on the adoption of a cashless economy. The discussion will provide insights into how macroeconomic factors play a crucial role in shaping the cashless economy in India. Through an analysis of secondary data, this study aims to shed light on the influence of these variables on the cashless economy and their interrelationships. The findings and analysis presented in this section can help policymakers and stakeholders make informed decisions and implement effective strategies to promote the growth of a cashless economy in India.

(H1). As GDP increases, the adoption and usage of cashless payment methods in the economy will also increase in India.

The finding of the analysis shows that the coefficient for GDP is positive (6.247 million) and statistically significant ($p < 0.05$). This indicates that as GDP increases, the cashless economy is likely to increase as well. Therefore, it can accept the hypothesis that GDP has a positive impact on the cashless economy in India. This could be attributed to the fact that a higher GDP means increased purchasing power and a higher demand for digital transactions. Increased digitalization, as the Indian economy becomes more digitalized, more transactions move away from cash and towards electronic payments. With a higher GDP, more people have access to digital payment methods, leading to an increase in adoption of cashless transactions. Innovation in payment technologies, as GDP grows, businesses have more resources to invest in new payment technologies, such as mobile payment systems, contactless payments, or blockchain-based systems.

These new technologies make cashless transactions more convenient and secure, leading to an increase in adoption. Consumer preferences, as people become more familiar with cashless payment options in India, they begin to prefer them over cash. With a higher GDP, people have more exposure to digital payment options and are more likely to adopt them as their preferred payment method. The hypothesis is supported by the results. This is in line with previous study conducted, such as the study by Manyika et al., (2016), which found that a rise in GDP leads to an increase in digital transactions furthermore the report found that the digital economy has grown world GDP by 10.1 per cent. Another study by Simon Oyewole et al.,(2013) found that extensive research has been conducted to explore the correlation between GDP and the adoption of cashless payment methods, embracing electronic payment systems can drive a transition towards a cashless society, presenting opportunities for favorable impacts on economic activities. The possible explanation for the positive impact of GDP on cashless economy could be that as GDP increases, there is greater demand for more efficient and modern payment systems. This demand could be driven by the increased availability of technology and greater access to financial services, both of which are typically associated with higher levels of economic development. As a result, higher levels of GDP may lead to increased adoption of cashless payment methods. Moreover, the positive impact of GDP on cashless economy could be explained by the fact that countries with higher GDP typically have a more developed financial infrastructure, including better electronic payment systems, which makes it easier for consumers to adopt cashless payment methods. In addition, countries with higher GDP may have a higher level of trust in financial institutions, which could also contribute to a greater willingness to adopt cashless payment methods.

(H2). As Tax collection increases, the adoption and usage of cashless payment methods in the economy will also increase in India.

The findings of this research demonstrate a positive impact of tax collection on the cashless economy in India. The study reveals that as tax collection increases, there is a corresponding rise in the adoption and usage of cashless payment methods. Several reasons contribute to this observed relationship, highlighting the crucial role of tax collection in driving the cashless ecosystem in the country. The coefficient of tax is 89.22 with a p-value of 0.000, indicating that tax collection has a statistically significant positive impact on the adoption of cashless economy in India. This means that for every unit increase in tax collection, it can expect a corresponding increase in the adoption of cashless payments. As Improved tax collection mechanisms encourage individuals and businesses to conduct more formal transactions. Cashless payment methods leave a digital trail that

facilitates easier monitoring and reporting of financial activities, reducing the propensity for tax evasion. As tax compliance increases, there is a growing need for transparency and traceability in financial transactions, leading to greater acceptance and usage of cashless payment options. The Indian government has been actively promoting digitalization and cashless transactions as part of its broader financial inclusion and digitization drive. With increased tax collection as one of its objectives, the government has introduced various incentives and initiatives to encourage the adoption of cashless payment methods. These efforts have positively influenced the behavior of both consumers and businesses, fostering a cashless ecosystem. Effective tax collection requires individuals and businesses to have access to formal financial services. By expanding the reach of formal banking and digital payment systems, the government has created an enabling environment for cashless transactions. As more people gain access to these services, the likelihood of engaging in cashless transactions increases, further strengthening the cashless economy. A higher tax collection reflects a reduced reliance on cash-based transactions. As tax revenues increase, there is a decreasing need for cash-intensive economic activities. This shift away from cash-dependent practices paves the way for the widespread adoption of cashless payment methods as a more efficient and convenient alternative. A well-functioning tax collection system instils trust and confidence in the economy, both domestically and internationally. As tax compliance improves, it enhances India's overall financial reputation, making it more attractive for foreign investments and business ventures. This increased confidence further fuels the acceptance and usage of cashless payment methods, as they are perceived as a secure and reliable means of conducting transactions.

The study is in line with the previous studies for example a study by Remige, (2020) his Research indicates that a cashless economy offers significant advantages concerning tax collection. The adoption of electronic payment systems enables governments to track transactions more efficiently, reducing the potential for tax evasion. Additionally, these systems provide a transparent trail of financial transactions, enabling tax authorities to identify discrepancies or underreporting of income with greater ease. As a consequence, tax collection becomes more precise and efficient, leading to a rise in government revenue. Ultimately, the move towards a cashless economy can contribute to better fiscal management and improved public services. Another study by Immordino & Russo, (2018) found that the analysis reveals a correlation between the value-added tax (VAT) and the use of electronic payments via debit and credit cards, which indicates that electronic payments can help to mitigate VAT evasion. However, findings of the study also showed a positive correlation between VAT evasion and the withdrawal of cash from automated

teller machines (ATMs). In other words, the use of cash withdrawals at ATMs appears to facilitate VAT evasion. Similarly, a study by Kenneth S. Rogoff, (2017) concludes in his study that there are benefits from less use of cash since it discourages tax evasion, illegal immigration and crime and enables governments and central banks to handle economic This suggests that tax collection has a positive relationship with a cashless economy.

(H3). As Inflation increases, the adoption and usage of cashless payment methods in the economy will also increase in India.

Results show that it can be observed that inflation has a significant negative impact on the adoption of cashless transactions in India. The regression coefficient for inflation is $-8.66E+08$ with a standard error of 57,895,924 and a t-value of -14.96, which is statistically significant at a 95% confidence level. The negative coefficient for inflation suggests that as inflation increases, the adoption of cashless transactions decreases in India. This is due to the fact that inflation erodes the value of money and reduces the purchasing power of individuals, leading to a preference for cash transactions over digital payments. Additionally, inflation leads to an increase in transaction fees and other charges associated with digital payments, further discouraging individuals from adopting cashless transactions. Moreover, during times of high inflation, people tend to hoard cash as a store of value, which can result in a shortage of cash in the economy. This shortage of cash can lead to increased demand for cash transactions, as people are unable to make digital payments due to a lack of liquidity. High inflation rates can erode the purchasing power of consumers and businesses, making them more cautious about spending money, especially on non-essential items like digital transactions. it also leads to increased transaction costs for digital payments, as service providers may pass on the higher costs of doing business to their customers. it also leads to increased volatility in financial markets, which may reduce the confidence of consumers and businesses in digital payment systems. This study is in line with the existing studies for example a study by Titalessy, (2020) found that there is no significant positive relationship between debit card transactions and inflation, he also found credit card transactions have no significant effect on inflation. Similarly, another study by Gupta., (2017) explains that with fewer cash transactions in society, inflation also will decline in the society. This means that there is a negative relationship between inflation and a cashless economy because this shortage of cash can lead to increased demand for cash transactions, as people are unable to make digital payments due to a lack of liquidity.

Conclusion

This paper examined the impact of GDP, Tax, and Inflation on the adoption of a cashless economy. The regression analysis revealed that GDP had a significantly positive effect on the adoption of cashless transactions, suggesting that as GDP increases, the usage of cashless methods also increases, this suggests that as the GDP of India grows, there is an increase in the volume of cashless transactions. The findings highlight the potential economic benefits associated with a cashless economy and emphasize the importance of promoting economic growth as a means to facilitate the adoption of digital payment systems. Similarly, Tax revenue showed a positive impact, indicating that higher tax revenues are associated with increased adoption of cashless transactions. This suggests that individuals are more likely to adopt cashless transactions when tax incentives or benefits are provided. Similarly, it suggests that an increase in cashless transactions will eventually increase the revenue for the government. The results underline the significance of aligning tax policies with the promotion of digital transactions can motivate individuals to adopt digital payment systems. On the other hand, Inflation had a negative impact, implying that higher levels of inflation lead to a decrease in cashless transactions. Based on the analysis of empirical data and statistical findings, the research draws the following conclusions:

The results of this study support the hypothesis (H1) that as GDP increases, the adoption and usage of cashless payment methods in the economy also increase in India. The positive relationship between GDP and the cashless economy indicates that economic growth and increased financial transactions go hand in hand with the adoption of digital payment methods. As India's GDP expands, there is a growing inclination towards cashless transactions, reflecting the nation's evolving financial landscape. The findings confirm the hypothesis (H2) that as tax collection increases, the adoption and usage of cashless payment methods in the economy also increase in India. Effective tax collection initiatives and policies have played a pivotal role in encouraging formal financial transactions and enhancing transparency. As the government emphasizes tax compliance and formalization, individuals and businesses are incentivized to utilize cashless payment options to facilitate tax reporting and compliance. Contrary to the hypothesis (H3), the analysis revealed that as interest rates increase, the adoption and usage of cashless payment methods do not necessarily increase in India. The results suggest that interest rates alone may not be the primary driver for the adoption of cashless transactions. Other factors, such as convenience, technological infrastructure, and government policies, appear to play more significant roles in influencing cashless payment adoption in the country.

This comprehensive research study has provided valuable insights into the relationships between GDP, tax collection, interest rates, and the adoption of cashless payment methods in India. The findings reveal a positive and significant correlation between GDP and the cashless economy, indicating that as India's economy grows, there is an increased inclination towards digital payment methods. Similarly, effective tax collection initiatives have played a crucial role in promoting formal financial transactions and driving the adoption of cashless payments in the country. However, it is noteworthy that the impact of interest rates on cashless payment adoption was not found to be as prominent as initially hypothesized. Other factors, such as convenience, technological infrastructure, and government policies, appear to be more influential in shaping the adoption of cashless transactions. The implications of this research are far-reaching. Policymakers and stakeholders can use these findings to develop evidence-based strategies that further accelerate India's journey towards a robust and inclusive cashless economy. Promoting economic growth and enhancing tax collection mechanisms will undoubtedly bolster the adoption of cashless payment methods, contributing to the country's financial development and fostering financial inclusion. As India continues its dynamic transformation into a digital economy, the successful integration of cashless payment methods holds tremendous potential to drive financial efficiency, reduce cash dependency, and unlock new avenues for economic prosperity. Policymakers, financial institutions, and businesses must work collectively to leverage these insights and pave the way for a future where cashless transactions are not just a convenience but a cornerstone of India's financial landscape. This research stands as a pivotal contribution towards understanding the intricate connections between key macroeconomic factors and the cashless economy in India. With the right strategies and a collective commitment to fostering a cashless ecosystem, India is poised to embrace a more efficient, transparent, and inclusive financial future, benefitting individuals, businesses, and the nation's overall economic well-being.

Suggestion

Firstly, conducting a longitudinal study with data over an extended period could provide more comprehensive insights into the relationship between GDP, tax collection, interest rates, and the adoption of cashless payment methods in India. Examining trends and changes over time may help identify any evolving patterns or shifts in the cashless ecosystem. Secondly, incorporating qualitative analysis through surveys, focus groups, or interviews could provide a deeper understanding of the factors influencing the adoption of cashless payment methods in India. Qualitative data can offer valuable context and nuance to complement the quantitative findings. Thirdly, conducting a regional analysis could shed

light on variations in the adoption of cashless transactions across different states or cities in India. Exploring regional disparities could help identify specific challenges or opportunities in promoting cashless payment methods in various regions. Fourthly, Investigating the impact of technological advancements and innovations in the payment industry on the cashless economy would be beneficial. Analyzing the influence of emerging technologies such as blockchain, digital wallets, and contactless payments could offer valuable insights into their role in driving cashless adoption. Fifthly, Further research can focus on the effectiveness of specific government policies and initiatives aimed at promoting cashless transactions. Understanding the impact of policy interventions can guide policymakers in designing more targeted and effective strategies to foster cashless adoption. Sixthly, delving deeper into consumer behavior and preferences regarding cashless payment methods can provide valuable insights into the drivers and barriers to adoption. Understanding the factors influencing consumers' choices can help design tailored marketing and educational campaigns to promote cashless transactions. seventhly, Exploring the relationship between financial inclusion efforts and the adoption of cashless payment methods can be insightful. Analyzing how increased access to formal financial services impacts cashless adoption, particularly among marginalized populations, can contribute to more inclusive financial policies. Eighthly, conducting comparative studies with other countries that have made significant strides in transitioning to cashless economies can provide valuable benchmarks and lessons for India's journey. By addressing these suggestions, future research can build upon the foundations laid by this study and continue to contribute to India's progress towards a vibrant and thriving cashless economy.

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