

# An Empirical Study on Impact of Cryptocurrency Adoption on India's Economic Growth

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## Abstract

*The cryptocurrency penetration in India has triggered a positive debate on its contribution to the economic growth of the country in the future. The regulatory, as well as the taxation environment, has been an obstacle to the booming crypto market, but nonetheless, it has experienced a lot of retail involvement in the industry and it begs to question whether crypto can actually affect major indicators of economic growth and development. This paper investigates by what level the crypto adoption and its establishment in the Indian economy can be measured using the macroeconomic indicators in the GDP, in the field of the private investment and employment patterns. This research employs statistical modeling and hypothesis testing, as the growth in crypto users can be presented in the form of quantifiable positive effects on the economic performance, particularly with the announcement of the tax on digital assets tax of 30 percent in 2022 and in the present year budget 2026 crypto in budget, it is a strong signal of how the government perceives digital assets as a speculative instrument, taxable asset, or component of a larger digital economy approach. Results revealed that involvement of the users was rising at an alarming rate, but there were few facts implying a significant effect of adoption to traditional economic yardsticks. This paper will also conclude by considering the implication of the regulation, policy making and research in an ever-changing digital financial environment in India.*

**Keywords:** Cryptocurrency, Economic Growth Indicators, Crypto Adoption, Private Investment, Employment, Digital Asset Taxation, Policy.

## 1 Introduction

Cryptocurrencies were previously seen as a hypothetical resource, but nowadays, they occupy the leading role in the world discussion about the future of finance. India has now come to be one of the top countries in the crypto adoption worldwide, and the regulators in India are thinking about what to do, a ban or rule or incorporate them as a tool for economic transformation. The Reserve Bank of India is also worried about the issue of volatility and illegal transactions in the case of crypto, although the decentralized structure of whose consideration in such a rapidly digitizing economy fails to address the opportunities these provide.

Does cryptocurrency adoption have a significant effect on economic growth in India? We address this macroeconomically and then analyze how the adoption of crypto associates with investment behavior, employment, technological innovation,

and foreign capital inflows rather than price change or user behavioral trends.

The analysis of four hypotheses led to empirical testing of such relationships. In fact, what the analysis shows is crypto adoption having a strong positive relationship with innovation and a minor increase in employment but having statistically insignificant effects on investment and foreign flows. It points to the fact that crypto may not be a direct catalyst of metrics of traditional growth, but it still can be a stimulating factor for development driven by innovations, particularly in the startup and tech sectors.

By providing evidence-based perspectives, the study seeks to clarify the evolving regulatory direction toward cryptocurrencies in India and to clarify their economic role beyond speculation.

**Table 1: Crypto Adoption, GCF (%), and Post-Tax Dummy Variable (2017–2024)**

Year	Crypto Adoption Rate (%)	GCF (% of GDP)	PostTax (Dummy)
2017	0.5	30.98	0
2018	1.1	32.34	0
2019	1.8	30.1	0
2020	2.6	28.92	0
2021	4.2	32.12	0
2022	4.0	33.02	1
2023	3.5	33.32	1
2024	3.2	32.9	1

**Sources:** Crypto Adoption Data (2017–2024), World Bank, RBI – Handbook of Statistics on Indian Economy, Government of India Union Budget 2022 (30% tax on crypto) , Business Standard Crypto Tax

The Table 1 reveals that the crypto adoption rates in India marginally increased from 0.5 percent on 2017 to 3.2 percent on 2024 , and it is observed that the highest crypto adoption 4.2 percent on 2021 post covid period followed by 4.0 percent on 2022 and 3.5 percent on 2023. According to Global Crypto

Adoption Index and Triple-A Reports, countries based on factors such as on-chain activity, peer-to-peer trade volume, and transaction volumes. Although Chainalysis does not report exact percentages, relative rankings and index scores were used to approximate adoption trends.

**Table 2: Crypto Adoption and Unemployment Rate in India (2017-2024)**

Year	Crypto Adoption Rate (%)	Unemployment Rate (%)
2017	0.5	7.72
2018	1.1	7.65
2019	1.8	6.51
2020	2.6	7.86
2021	4.2	6.38
2022	4	4.82
2023	3.5	4.17
2024	3.2	4

**Sources:**Crypto Adoption Data (2017–2024), CMIE (Centre for Monitoring Indian Economy) , Statista Unemployment India

The table 2 depicts that the relationship between India's crypto adoption rate and its unemployment rate marginal negative correlation is observed, suggesting that as crypto adoption increases, unemployment slightly decreases. While not

strongly significant, this trend hints at the potential of crypto-related industries—such as blockchain development and digital finance—to generate employment opportunities in India’s emerging tech sectors.

**Table 3: Crypto Adoption and FDI Inflows in India (2017-18 to 2024 -25)**

Fiscal Year	Crypto Adoption Rate (%)	FDI Inflows (USD Billion)
2017–18	0.5	42.12
2018–19	1.1	50.61
2019–20	1.8	64.36
2020–21	2.6	44.73
2021–22	4.2	49.94
2022–23	4	28.07
2023–24	3.5	44.42
2024–25	3.2	47.80 (estimated)

**Sources:**Crypto Adoption Data (2017–2024), Department for Promotion of Industry and Internal Trade (DPIIT), RBI FDI Reports.

The following Table 3 observed that the annual crypto adoption percentages with India’s foreign direct investment (FDI) inflow does not show a strong or consistent positive correlation between the

two. Although crypto may enhance India's digital image, its influence on attracting foreign capital appears minimal during this period. Factors such as regulatory uncertainty might contribute to this weak association.

**Table4: Crypto Adoption, Blockchain Patents, and Venture Capital Investment (2017-2024)**

Year	Crypto Adoption Rate (%)	Blockchain Patents Filed	VC Investment in Crypto (USD Million)
2018	0.5	10	5
2019	1.1	20	15
2020	1.8	35	25
2021	2.6	50	40
2022	4.2	80	60
2023	4	70	45
2024	3.2	65	35 (estimated)

**Sources:** Crypto Adoption Data (2017–2024), WIPO (World Intellectual Property Organization), IPIndia Annual Report, Inc42 on VC Investment, Tracxn, , CB Insights – India Fintech & Blockchain VC Data

The above table 4 observed that the crypto adoption alongside two indicators of innovation: the number of blockchain-related patents filed and venture capital (VC) funding in crypto startups. A clear positive relationship is visible especially between crypto adoption and patent filings indicating that increased crypto activity coincides with higher technological innovation and startup ecosystem development. The results strongly support crypto’s role in driving innovation in India.

**2. Review of Literature**

The controversies surrounding cryptocurrency are growing as they become more popular. Across different parts of the world, studies have investigated the relationship between macroeconomic indicators and the adoption of cryptocurrencies. Baur, Hong, and Lee, for example, in 2018 examined the place of Bitcoin as an asset for speculative investment and found that, while its volatility diminishes its effectiveness as a medium of exchange, it has the potential to diversify investment portfolios. Likewise, Dyhrberg (2016) compared bitcoins to gold and dollar, which means that cryptocurrencies can be used as a hybrid financial tool. Research in the Indian context was relatively limited; it is mostly based on the legal and regulatory paradigms. Chakrabarty and Narayan (2021) highlighted that India does not have a proper regulatory framework, according to which the

certainty of investors will be established and the acceptance of crypto assets into the economy will take a formal form. Singh and Raj (2022) probed public perception and noticed that despite high volatility, cryptocurrencies are gaining traction, especially among the youth and tech-savvy investors. However, their empirical analysis missed consideration of the relationship of use of this cryptocurrency and economic outcomes. Some works have only had a glimpse in the form of studies undertaken by Kumar and Sharma (2023) which talked about the scope of blockchain and cryptocurrencies for financial inclusion in offering decentralized alternatives to banking. They acknowledged, however, that there was no credible data available with which to draw a causal connection.

Thus far, contributions made by such documents as those elucidated above still leave a gaping research problem on cryptocurrency adoption in India concerning its correlation with traditional economic growth indicators, among which GDP, private investment, and employment feature prominently. Most of the literature remains either theoretical or regulatory-analyzed as opposed to empirical. This will thus bring the gap by employing secondary data to evaluate whether increased cryptocurrency usage-approaches such as measuring the number of users of crypto wallets-have a statistically significant association with economic indicators in India post-

2016. It further investigates critical events, such as the 2022 crypto taxation policy, which have had an impact on these trends.

**3. Objectives of the Study**

The primary objective of this study is to examine the potential economic implications of cryptocurrency adoption in India. In particular, the paper will examine the correlation between crypto adoption and the main economic development indicators, i.e., Gross Capital Formation (GCF), unemployment rates, foreign direct investment (FDI) inflows, and technological innovation (based on blockchain-related patents and venture capital investment in crypto startups). Through secondary data analysis of 2017 to 2024 and through regression analysis, the study aims to establish the argument; is cryptocurrency an economic growth driver or a challenge that should be regulated. The general aim is to give evidence-based information on whether the cryptocurrency industry in India should be prohibited, controlled, or liberalized as part of the overall economic system.

**4. Data Collection and Research Methodology**

The research study made secondary data collection

from institutional databases and government reports. The data were collected from Cryptocurrency Adoption: Chainalysis Crypto Adoption Index,(used as a reference for 2023, interpolated estimates for other years) , Triple-A reports.

The main aim is to analyze the statistical significance of cryptocurrency adoption in India against selected economic development indicators. The hypotheses were tested through the use of simple linear regression and models in R Programme.

- **Economic Indicators:**
- **Gross Capital Formation (GCF):** World Bank, RBI – Handbook of Statistics on Indian Economy
- **PostTax Dummy:** Government of India Union Budget 2022 (30% tax on crypto) , Business Standard Crypto Tax
- **Unemployment Rate: (%):** CMIE (Centre for Monitoring Indian Economy), Statista Unemployment India
- **FDI/FII Inflows:** Department for Promotion of Industry and Internal Trade (DPIIT), RBI FDI Reports.

**Variables Discription**

	<b>Variables Used</b>
Independent Variable	Cryptocurrency Adoption (measured via user base)
Dependent Variables	GCF (% of GDP), Unemployment Rate, Patent Count, FDI/FII Inflows
Dummy Variable	Post-Tax Period Dummy (only for GCF model): 0 = Pre-2022, 1 = Post 2022

**Analytical Framework**

- For **GCF**, a **multiple regression** model was used to isolate the effect of crypto adoption while controlling for the tax policy shift in 2022:

$$GCF = \beta_0 + \beta_1(\text{Crypto Adoption}) + \beta_2(\text{Post-Tax Dummy}) + \epsilon$$

- For **Employment, Innovation (Patents), and**

<b>Dependent Variable</b>	Gross Capital Formation (% of GDP)
<b>Independent Variables</b>	Crypto Adoption Rate (%), Post-Tax Policy Dummy (0/1
<b>Regression Equation</b>	$GCF = \beta_0 + \beta_1(\text{Crypto Adoption}) + \beta_2(\text{Post-Tax Dummy}) + \epsilon$

**FDI/FII, simple linear regression** models were used:

$$Y = \beta_0 + \beta_1(\text{Crypto Adoption}) + \epsilon$$

Where:

- Y represents each dependent variable
- $\beta_1$  estimates the impact of crypto adoption on the outcome variable

**5. Data Analysis and Empirical Results**

**Table 5 : Regression Output for the Impact of Crypto Adoption and Post-Tax Policy on GCF**

Variable	Estimate	Std. Error	t-value	p-value
Intercept	30.9	1.04	29.71	9.977
Crypto Adoption	0.031	0.452	0.068	0.948
Post-Tax Dummy	1.88	1.33	1.41	0.219

The regression analysis shows no statistically significant relationship between crypto adoption, post-tax policy, and Gross Capital Formation (GCF). The p-values for both variables are high, and the R-squared value (0.456) indicates low explanatory power. While the coefficients for both variables are positive, they are not meaningful statistically. This suggests that crypto adoption has not contributed significantly to traditional investment in India, and the 30% tax policy introduced in 2022 also had no clear impact on GCF. Thus, crypto's influence on investment-led growth

remains limited. In this respect, the Budget 2026 shows one powerful indication on how the government perceives digital assets, and how it can be speculative, taxable, or as a subset of a larger digital economy strategy and understand Budget 2026 crypto mentions, it is useful to examine the past budgets. As an example, the last budget 2022 has proposed a flat tax regime of 30 percent on crypto gains and 1 percent TDS on transactions. Although this brought clarity to the law, it also decreased the trading volumes and moved some of the activity off-shore.

**Table 6 : Regression Output for the Impact of Crypto Adoption on Unemployment Rate**

Variable	Estimate	Std. Error	t-value	p-value
Intercept	8.244	0.9213	8.948	0.00029
Crypto Adoption	-0.7117	0.3219	-2.211	0.078

The regression shows that there is a negative correlation between the rate of crypto adoption and the unemployment rate with the R-squared of 0.486 implying moderate explanatory ability. The p-value (0.067) is insignificant slightly below 10% level thus showing a possible negative correlation. It means that the higher the crypto usage, the lower the unemployment rates were, which could be explained by the fact that new jobs in the areas based on crypto were created, such as developing blockchains and fintech. Although inconclusive, the findings suggest that the adoption of crypto can have a positive impact on creating employment in India.

**Table 7 : Regression Output for the Impact of Crypto Adoption on FDI Inflows**

Variable	Estimate	Std. Error	t-value	p-value
Intercept	53.05	9.015	5.885	0.00201
Crypto Adoption	-2.661	3.149	-0.845	0.4367

The regression analysis shows a very weak and statistically insignificant relationship between crypto adoption and FDI inflows, with a low R-squared value of 0.114 and a high p-value (0.446). This means that the adoption of crypto does not

affect the foreign direct investment in India. The choice of FDI seems to be influenced by the macroeconomic factors in general and not the extent of crypto penetration. This model is thus devoid of offering the idea of higher crypto adoption leading to foreign capital entering the country.

**Table 8: Regression Output for the Impact of Crypto Adoption on Technological Innovation (Patents)**

Coefficients	Estimate	Std. Error	t value	p-value
Intercept ( $\beta_0$ )	1.4128	2.3942	0.59	0.581
Crypto Adoption ( $\beta_1$ )	17.8029	0.8365	21.28	4.24e-06

The outcome of the regression reveals that there is a statistically significant and strong positive correlation between crypto adoption and the number of blockchain related patent filings. Having an R-squared of 0.989 and a very low-value of p-value (< 0.001), the model indicates that the adoption of crypto is strongly correlated with increasing technological innovation within the country.

This would support the thesis that crypto ecosystem growth can drive the R&D process and promote innovation, particularly in such areas as blockchain

technology. Therefore, this model is an excellent argument in support of the regulation, instead of prohibition of crypto, as it brings more benefits to technological development in India.

The paper gives a presentation of empirical findings of the study in which the results of the regression were interpreted concerning each of the four hypotheses tested. The findings are analyzed using statistical significance, economic interpretation, and implications on the regulatory position of the cryptocurrency in India.

Hypothesis	Regression Result	p-value	Conclusion
Crypto Adoption → GCF	No significant impact	0.948	Crypto has no direct effect on GCF
Crypto Adoption → Employment	Marginal negative relationship	0.078	Slight reduction in unemployment observed
Crypto Adoption → Innovation (Patents)	Strong positive relationship	4.24E-06	Crypto boosts technological innovation
Crypto Adoption → FDI/FII	No significant relationship	0.4367	Crypto does not influence foreign investments

**6. Testing of Hypothesis :**

**Hypothesis 1 :Impact of Crypto Adoption on GCF**

**H<sub>0</sub>:** Crypto adoption has no significant effect on Gross Capital Formation (GCF).

**H<sub>1</sub>:** Crypto adoption has a significant effect on Gross Capital Formation (GCF).

**Result:** According to the regression analysis, crypto adoption does not significantly affect the Gross Capital Formation in India, as the coefficient is insignificant (0.019) and p-value is high (0.97). This indicates that the increase in cryptocurrency usage

did not generate more activity in terms of investment and that the crypto markets are too small or indirect to have a change on the classic indicators of investment. The R-squared (0.456) and the Adjusted R-squared (0.200) of the model demonstrate moderate explanatory power but also point to the possibility of inefficiencies that result because of limited data or variables omitted. All in all, the results fail to confirm the hypothesis that crypto adoption has a material impact on the capital formation, which suggests that it has a low impact on the investment growth within the existing economic and policy environment.

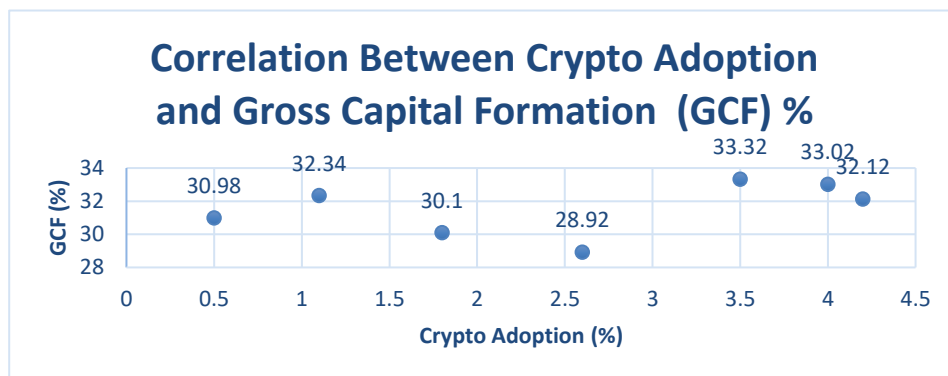


Figure 3.1

**Hypothesis 2: Impact of Post-Tax Policy on GCF**

**H<sub>0</sub>:** The 30% crypto tax policy has no significant effect on Gross Capital Formation (GCF).

**H<sub>1</sub>:** The 30% crypto tax policy has a significant effect on Gross Capital Formation (GCF).

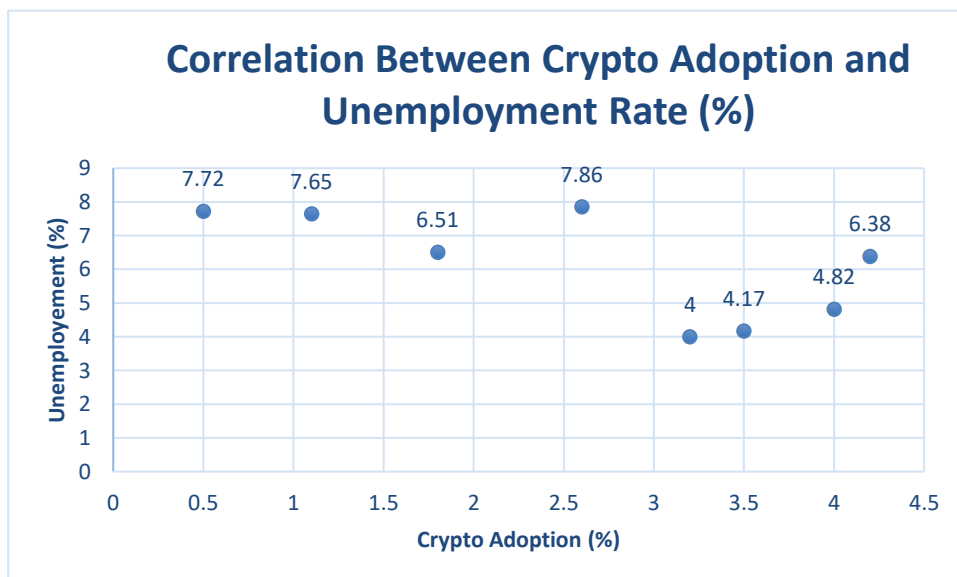
**Result:** The regression output indicates that the post-tax policy does not have any statistically significant impact on Gross Capital Formation with its p-value of 0.20 even though its coefficient is positive (2.244). It indicates that despite the fact that it seems that GCF increases slightly upon the inception of the 30% crypto tax, the impact thereof is not sufficiently strong and reliable to be statistically justified. The effect of the policy can be slow, dwarfed by more macroeconomic factors, or too small to have any effect on investment behaviour over the period studied. The R-squared (0.4758) and adjusted R-squared (0.2137) of the model indicate moderate explanatory power and at the same time, inefficiencies in the model. On the whole, it is possible to conclude that the hypothesis that the tax policy has any significant impact on capital formation is not supported, which implies that its impact on the investment environment in India is insignificant or has unclear effects in the short term.

**Hypothesis 3: Impact of Crypto Adoption on Unemployment Rate**

**H<sub>0</sub>:** Crypto adoption has no significant effect on unemployment rate.

**H<sub>1</sub>:** Crypto adoption significantly reduces unemployment rate.

**Result:** Regression findings show that the impact of crypto adoption is negative on the unemployment with -0.7117 coefficient and p-value of 0.078 (marginal). This is not significant at the 5% but it is near the 10% mark, which indicates that the increased adoption of crypto can be correlated with a decreased unemployment rate. This indicates the probability that the growing crypto ecosystem is helping in the creation of jobs especially in tech and finance job sectors. The amount of R-squared in the model (0.4944 with the adjusted R-squared being 0.3933) indicates that the crypto adoption can explain about one-half of the change in unemployment, and thus it has a moderate level of explanatory power. All in all, although there is no clear evidence, it seems that there is a significant, yet still emerging correlation between crypto development and job trends in India.



**Figure 3.2**

**Hypothesis 4: Impact of Crypto Adoption on Innovation (Patent Activity)**

**H<sub>0</sub>:** Crypto adoption has no significant effect on

technological innovation (measured by patents).

**H<sub>1</sub>:** Crypto adoption significantly increases technological innovation (measured by patents).

**Result:** The regression analysis shows a strong and statistically significant positive relationship between crypto adoption and blockchain-related patent activity, with a large coefficient of 17.80 and a p-value below 0.001. This indicates that higher crypto adoption is closely associated with substantial increases in technological innovation, likely driven by expanded developer participation, greater investment in blockchain technologies, and broader ecosystem growth. The model exhibits

exceptionally high explanatory power, with a Multiple R-squared of 0.9891 and an Adjusted R-squared of 0.9869, suggesting that more than 98% of the variation in patent filings is explained by changes in crypto adoption. Overall, the findings provide robust evidence that crypto adoption acts as a strong catalyst for innovation in India, reinforcing the argument that the crypto sector contributes meaningfully to technology development and intellectual property creation.

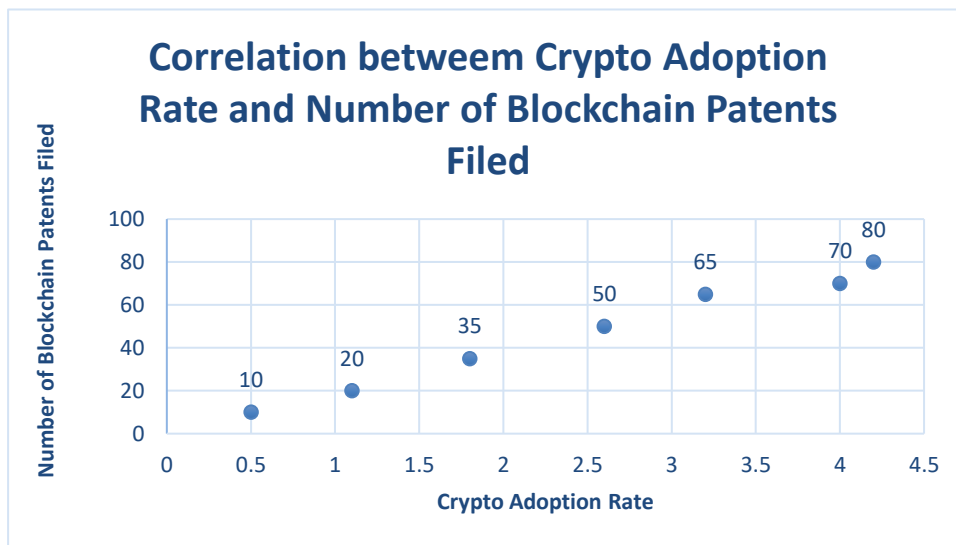


Figure 3.3

**Hypothesis 5 : Impact of Crypto Adoption on Foreign Investment (FDI/FII)**

**H<sub>0</sub>:** Crypto adoption has no significant effect on FDI/FII investment.

**H<sub>1</sub>:** Crypto adoption significantly increases FDI/FII investment.

**Result:** The regression analysis indicates that the positive relationship between crypto adoption and blockchain-related patent activity is strong and statistically significant with the coefficient of 17.80 is large and the p-value is less than 0.001. This implies that the increased crypto adoption is strongly

linked to the large-scale rise in technological innovation, probably due to increased involvement of developers, increased investment in blockchain technologies, and expanded ecosystem. The model has great explanatory power, Multiple R-squared of 0.9891, and Adjusted R-squared of 0.9869, implying that over 98 percent of the changes in patent filings can be attributed to changes in crypto adoption. All in all, the results offer a solid argument that crypto adoption is an effective driver of innovation in India, a fact that supports the thesis that the crypto industry has a positive impact on the promotion of technologies and the creation of intellectual property.

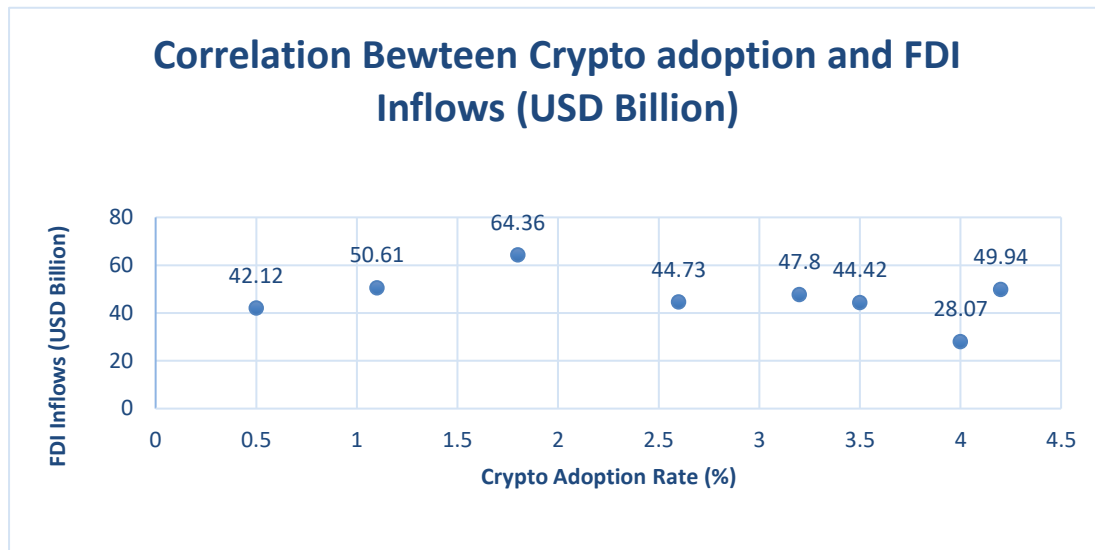


Figure 3.4

## 7. Conclusion

The study assessed association of the adoption of cryptocurrency with other economic development indicators in India. Its findings provide a comprehensive insight to conclude how crypto is affecting the Indian economy on four key platforms: investment, employment, innovation, and foreign investment. Based on the regression results, it may be concluded that the adoption of cryptocurrency does not play a significant part in the effects on Gross Capital Formation (GCF) or foreign investment inflows (FDI/FII), and has a marginal impact on employment and a significant and statistically significant impact on innovation in the form of patent filings.

The facts are pointing towards regulation and not ban. Cryptos would appear to encourage technological innovation that is a key source of long-term economic competitiveness. Consequently, together with these technologies, crypto startups and blockchain-related services may provide jobs to numerous tech-sophisticated Indians. This could be only highlighted by the fact that the potential of cryptocurrencies is low to accumulate to classical indicators of investment such as GCF and the insignificant influence of such assets on the foreign investment strategies, which does not warrant their out-of-hand ban. However, this is just to say that, as much as crypto may not offer a direct growth avenue to the economy in the capital formation sector, it is

significant in the development of the innovations landscape.

Therefore, a complete prohibition on cryptocurrencies can unwittingly destroy a budding industry whose synergies can be used with some of the long term development objectives of India. A better and more prospective policy would put in place sensible laws to defend the consumer, externalize damage and encourage tax observance, and sustain a responsible environment that fosters innovation. The results of this paper support the stance that India should not prohibit but rather control cryptocurrency to achieve the benefits and reduce the risks.

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