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The impact of interest rate policy on credit union lending during a crisis period

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ABSTRACT

We exploit the variation in the exposure to the Covid-19 pandemic of US states as a quasi-natural experiment to examine the impact of interest rate policy on credit union lending. We find that the interest rate cut can only enhance credit union lending in states that are less affected by the Covid-19 pandemic whilst hampering credit union lending in more affected states. This result is consistent across a number of robustness tests.

1. Introduction

The current Covid-19 pandemic has exerted severe impacts on health, wellbeing, social welfare, and the global economy (Kickbusch et al., 2020). Anecdotal evidence suggests that the pandemic has exerted a $16 trillion cost on the US economy, four times as much as that of the 2007–2009 global financial crisis (Bloomberg, 2020). In response to those negative effects, in March 2020, the Federal Reserve has decided to implement an interest rate cut to zero aiming to stimulate borrowings, encourage spendings, and ultimatly enhance economic demand.

Whilst similar interest rate policy had been also adopted during the past crisis periods, its effectiveness is still under a heated debate. For example, Gambacorta et al. (2015) and Hristov et al. (2014) conclude that the transmission of policy rates to lending rates is distorted during crisis periods due to significant macroeconomic shocks, making interest rate policy less effective during this time. In contrast, Von Borstel et al. (2016) find that interest rate pass-though remains effective during crisis periods, but the composition of the pass-through does change.

Unlike any prior crises, the Covid-19 pandemic is relatively exogenous and does not affect everyone equally. Arguably, while some jurisdictions have been heavily affected by the pandemic, the others are less being affected . In this context, the needs for financing to tackle negative externalities imposed by the Covid-19 pandemic may also vary across jurisdictions. Therefore, understanding whether the interest rate cut can benefit those people who are in real need of it or would it be taken advantage of by those who are less affected by the pandemic is a question of first-order importance.

In this paper, we investigate the impact of the interest rate cut on credit union (CU) lending. CUs are financial institutions, where

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Table 1
Baseline results – the impact of interest rate cut on credit union lending during the Covid-19 pandemic.

Panel A: Full sample		
	Ln(Loan) (1)	*Ln(Loan)* (2)
IR Cut	0.0045	0.0172***
	(0.0041)	(0.0054)
IR Cut × *Affected*		−0.0311***
		(0.0073)
Observations	3228	3228
Control variables	YES	YES
CU fixed effects	YES	YES
Panel B: Low-capitalized versus high-capitalized CUs		
	Low-capitalized CUs *Ln(Loan)* (1)	High-capitalized CUs *Ln(Loan)* (2)
IR Cut	0.0244***	0.0067
	(0.0062)	(0.0075)
IR Cut × *Affected*	−0.0400***	−0.0357***
	(0.0083)	(0.0122)
Observations	1574	1613
Control variables	YES	YES
CU fixed effects	YES	YES

Note: This table provides the results of a DiD regression to estimate the effect of interest rate cut on credit union lending during the Covid-19 pandemic (from Q1-2020 to Q1-2021). Panel A shows the result of the full sample, while Panel B reports the results of the sub-sample classifed based on the capitalization level. The dependent variable is *Ln(Loan)*, measured the lending value of credit union (in natural log). *IR Cut* equals one from Q2-2020 onward, and zero otherwise. *Affected* equals one if the credit unions locate in states that are consistently ranked in the top quartile regarding the number of reported deaths by Covid-19 scaled by state area, and zero if credit unions locate in states that are consistently ranked in the bottom quartile. Robust standard errors are in parentheses. ***, **, and * denote significant levels at 1%, 5%, and 10% respectively.

they provide financial services to their customers primarily through receiving deposits and generating loans. In this regard, CUs operate similarly to commercial banks. However, they are distinguished from for-profits commercial banks by being non-profit and tax-exempt institutions. In addition, unlike banks, credit unions are not directly tied to the Federal Reserve authority, and some rely on the banking system or local deposits to raise their fundings. They are also different from banks in terms of objective functions. The ultimate mission of CUs is not profit-maximization but to offer a safe and affordable alternative source of financing for individuals of modest means. However, CUs restrict the provision of services only to their members-owners those share a "common bond"[1] (Ely, 2014). This unique feature allows CUs to have access to some private information, which subsequently enables them to offer safe, stable and competitive financial services to their members, including unbanked, underserved and low-income individuals.

These differences make earlier studies on behavior and strategic decisions of for-profits counterparts like commercial banks are not directly applicable for credit unions, especially during the crisis period. For example, Cororaton (2018) document that, unlike banks, not-for-profit CUs tend to sustain their lending despite operating under lower profitability margins in the post-crisis period. Given the scarcity of prior studies as well as the imperative role of CUs in the credit market, we believe that CUs is a good setting to examine the effectiveness of interest rate policy on credit situations in different states where the destruction of the pandemic varies.

2. Methodology and data

We exploit the variation in the exposure to the Covid-19 pandemic of US states as a quasi-natural experiment to examines the impact of interest rate policy on CU lending. Our analyses are based on the following difference-in-differences (DiD) regression:

$$Ln(Loan)_{i,t} = \alpha + \beta_1 IR\ Cut_t + \beta_2 Affected_i + \beta_3 IR\ Cut_t \times Affected_i + \gamma Controls_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

where *Ln(Loan)* is the natural logarithm of CU total loans (in million dollars). *IR Cut* indicates the impact of the interest rate cut, which is a dummy variable that equals one if the observation is from Quarter 2 of 2020 onwards, and zero otherwise.[2]

[1] Common bonds are established on pre-existing social connections, which unite members of CUs to the saving and borrowing terms (McKillop and Wilson, 2015; Pavlovskaya et al., 2020).

[2] During the Covid-19 pandemic, there are several policies enacted to support the financial stability in the US. Although other policies (rather than the rate cut) only have minimal or no effects on CU lending, we cannot really isolate those effects from the impact of the rate cut. This is a limitation of our paper that opens a direction for future research.

Table 2
Robustness checks.

Panel A: Regression results using alternative methods to classify affected and non-affected credit unions

	(1) *Ln(Loan)*	(2) *Ln(Loan)*	(3) *Ln(Loan)*
IR Cut	0.0236***	0.0134***	0.0003
	(0.0046)	(0.0041)	(0.0022)
IR Cut × *Affected_Quintile*	−0.0451***		
	(0.0073)		
Covid-19 Intensity		0.0027	
		(0.0017)	
IR Cut × *Covid-19 Intensity*		−0.0042***	
		(0.0015)	
Mobility			−0.0018
			(0.0014)
IR Cut × *Mobility*			0.0025***
			(0.0008)
Observations	1937	14,754	14,814
Control variables	YES	YES	YES
CU fixed effects	YES	YES	YES

Panel B: Validity of DiD setting

	(1) Parallel trend	(2) Random Asignment	(3) Entropy Matching
	Ln(Loan)	*Ln(Loan)*	*Ln(Loan)*
Affected	−0.0930		
	(0.2152)		
IR Cut		0.0067	0.0121**
		(0.0055)	(0.0054)
IR Cut × *Affected*		−0.0003	−0.0250***
		(0.0079)	(0.0075)
Observations	1302	3228	3222
Control variables	YES	YES	YES
CU fixed effects	YES	YES	YES

Note: This table provides the results of a number of analyses to test for the robustness of the empirical results and validity of model specification. Panel A reports the regression results of a DiD regression to estimate the effect of interest rate cut on credit union lending during the Covid-19 pandemic (from Q1-2020 to Q1-2021) using alternative methods to classified affected and non-affected credit unions. The dependent variable is *Ln(Loan)*, measured the lending value of credit union. *IR Cut* equals one from Q2-2020 onward, and zero otherwise. In Column (1), *Affected_Quintile* is a dummy variable which equals one if the credit unions locate in states that are consistently ranked in the top quintile regarding the number of reported deaths by Covid-19 scaled by state area, and zero if credit unions locate in states that are consistently ranked in the bottom quintile. In Column (2), *Covid-19 Intensity* is the quartile ranking of states where credit unions are located by quarter, based on the number of reported deaths by Covid-19 scaled by state area. In Column (3) *Mobility* is the mobility index of US states reported by Google. Panel B reports the robustness tests for the effect of interest rate cut on credit union lending during the Covid-19 pandemic. Column (1) reports the regression results to test for parallel trend of our affected and non-affected samples. Column (2) of Panel B shows the regression results when the affected and non-affected states are randomly assigned. And Column (3) presents the regression results when the affected and non-affected samples are matched using entropy matching approach. Robust standard errors are in parentheses. ***, **, and * denote significant levels at 1%, 5%, and 10% respectively.

Affected is a dummy variable that equals one if the CU is located in a more affected state, and zero if the CU is in a less affected state. To identify more/less affected states, we follow DuPre et al. (2021) and Norden et al. (2021) and rank states by the number of reported deaths caused by Covid-19 scaled by state area for each quarter.[3] We then classify states that are consistently ranked in the first quartile (i.e. lowest level of Covid-19 deaths) during the entire studied period as the less affected area. Whereas those that consistently belong to the fourth quartile (highest level of Covid-19 deaths) are more affected states. *IR Cut* × *Affected* is the DiD term that indicates the different impact that the interest rate cut has on states that are heavily affected by the Covid-19 pandemic, compared to less affected states.

$Controls_{i,t-1}$ is a vector of the lagged value of our control variables. These include *ROA* (total incomes to total assets); *LLP* (total loan loss provisions to total assets); *Cash* (cash to total assets); *NPA* (nonperforming assets to total assets), *Chargeoff* (net charge-off to total assets); *Networth* (networth to total assets); *Current Member* (annual growth rate of total current members); *Potential Member* (annual growth rate of total potential members); and *Market Penetration* (total current members to total potential members).

In this study, we utilize quarterly data of federal CU lending taken from the SNL Financial database during the period from Quarter 1 of 2020 to Quarter 1 of 2021. Our full dataset comprises of 14,814 observations of 2979 CUs from 50 states. However, since we only consider the most and least affected states by the Covid-19 pandemic in our main regressions, our final sample is reduced to 3231 observations of 650 CUs from 20 states. Statistics related to the Covid-19 pandemic are retrieved from the John Hopkins Coronavirus

[3] Our conclusion remains unchanged if we rank states using the number of reported Covid-19 cases scaled by state area.

Resource Center (https://coronavirus.jhu.edu/).

3. Findings and discussions

3.1. Main findings

Our baseline regressions are reported in Panel A of Table 1. Column 1 documents the results when we only examine the impact of the interest rate cut on CU lending. The results show that, on average, the interest rate cut exerts no significant impact on CU lending, with the coefficient of *IR Cut* being statistically insignificant.

Column 2 shows the regression results when we include *Affected, IR Cut* × *Affected* and CU fixed effects in the model. We find that the coefficient of *IR Cut* is 0.0172, significant at the one percent level, suggesting an increase in *Ln(Loan)* in less affected states following the interest rate cut. Given that the (untabulated) mean value of *Ln(Loan)* in the quarter before the interest rate cut is 9.8030, this suggests a 1.7% increase in lending value of CU located in less affected states.[4] We also document that the sum of coefficients for *IR Cut* and *IR Cut* × *Affected* is −0.0139 (F-value = 0.0119), which means the interest rate cut in fact exerts a negative impact on CU lending in the most affected states. Such decrease is equivalent to 1.3% of the average CU lending before the interest rate cut.[5]

Altogether, the results suggest that whilst the interest rate cut can enhance CU lending in states that are less affected by the pandemic, it hampers CU lending in more affected states where the policy should have targeted. These findings align with the conclusion by Gambacorta et al. (2015) and Hristov et al. (2014) that interest rate policy can be less effective during crisis periods, possibly due to the structural shocks caused by the crises that hamper the effectiveness of this policy.

3.2. Low-capitalized versus high-capitalized CUs

The extant literature documents that, worse-capitalized banks tend to issue more loans to weaker borrowers, who get refused by better-capitalized banks (Dursun-de Neef and Schandlbauer, 2021). We test whether this is also true for CUs. Specifically, we rerun our regressions on two subsamples of CUs with low and high capitalization (split by the median value of *Net worth/Total assets*) and report the results in Panel B of Table 1.

Overall, we find that the coefficients for *IR Cut* × *Affected* in both regressions are negative and significant. However, the coefficient of *IR Cut* is only significant for low-capitalization credit unions. This means, in general, low-capitalization credit unions perform better compared to their high-capitalization peers after the rate cut. However, since the sum of coefficients for *IR Cut* and *IR Cut* × *Affected* is negative and significant (i.e. 0.0244 – 0.0400), this suggests that low-capitalization CU in more affected states still suffer from a reduction in lending though the reduction is not as much as that of high-capitalization CU.

3.3. Alternative measures of the pandemic impact

We next examine whether our main results are subject to our method of classifying more/less affected states by the Covid-19 pandemic. The results are reported in Panel A of Table 2.

First, we account for the fact that the pandemic situation in the US is fairly severe, which means even the least affected states suffer a lot from the pandemic. We, therefore, rank US states by quintile instead of quantile regarding the number of Covid-19 deaths scaled by state area, and require that a state must be consistently ranked in the lowest/highest quintile during the entire studied period to be considered less/more affected areas.

Second, whilst focusing on the most and least affected states by the pandemic, we drop the remaining states from our analyses, which may cause information loss. We therefore attempt to account for CUs from all states by replacing *Affected* in our regression model by *Covid-19 Intensity*, which is the quartile ranking of states based on the reported number of Covid-19 deaths scaled by state area for each quarter across the studied period.

Third, we account for the concern that the number of Covid-19 deaths may not be a reliable measure for the severity of the Covid-19 pandemic as the true number of Covid deaths may be undercounted. Specifically, we utilize the global mobility index reported by Google (*Mobility*) as our alternative measure. We argue that areas that are more affected by the pandemic would have lower mobility index compared to the less affected areas. This is due to the stricter movement restriction policies to combat the pandemic where the pandemic stituation is more severe. This mobility index is captured by Google satellites, thus, it is a more objective measure of the pandemic severity.

Regardless of the alternative measures that we use, the results remain qualitatively consistent with our main conclusion.

3.4. Validity of DiD setting

Similar to other studies that utilize quasi-natural experiment, our research may face concerns about the validity our DiD setting. We attempt to mitigate this problem by utilizing three different strategies and report the results in Panel B of Table 2.

First we perform parallel trend analyses by regressing *Ln(Loan)* against *Affected* and all control variables, utilizing the data of five

[4] 1.7% = exp(9.8030+0.0172)/exp(9.8030)−1

[5] −1.3% = exp(9.8030-0.0139)/exp(9.8030)−1

Fig. 1. Parallel trend analysis. This Figure shows the trend in the quarterly change of credit unions' lending value (*D_Loan)* from Q1-2019 to Q1-2021. The red line represents the mean *D_Loan* for the more affected sample of credit unions whiles the blue line depicts the mean *D_Loan* for the less affected sample over the quarters. Q1-2020 is the time of interest rate cut adoption. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.).

quarters prior to our sampling period (i.e., Q4-2018 to Q4-2019). The result in Column 1 shows that the coefficient of *Affected* is not statistically significant. In addition, we also provide Fig. 1 to depict the changes in loan levels of CUs in more (red line) and less affected states (blue line). Accordingly, the gap between the two lines is minimal before the interest rate cut and becomes larger after the policy adoption. Altogether, these suggest that there is no difference in the level of CU lending between the more and less affected states in our sample before the policy.

Second, we perform a placebo test by randomly assigning the more or less affected status among the 50 US states. Our results, utilizing the altered sample, show that the coefficient of *IR Cut* × *Affected* is no longer significant, which further supports the causal relationship in our main conclusion.

Finally, we perform entropy matching to create two comparable subsamples of CUs from more and less affected states. The matching criteria include all control variables in our regression model. This test is to ensure that our results are not driven by the heterogeneous characteristics of CUs in more and less affected states. We rerun our regression on the matched sample, again the results are consistent with our conclusion.

3.5. Further analyses

We explore whether the ineffectiveness of the policy rate cut in more affected states can be explained by the weaker transmission of policy rates to lending rates in those states (Gambacorta et al., 2015; Hristov et al., 2014). Specifically, we examine how CU interest rates change in response to the interest rate cut. The results are reported in Panel A of Table 3. We find that in 6 out of 11 regressions, the coefficients of *IR Cut* are negative and significant, suggesting a decrease in interest rate following the interest rate cut. However, the coefficients for *IR Cut* × *Affected* are insignificant in all regressions except for one (i.e., other unsecured loans). This means the interest rate cut has a relatively similar impact on CU lending rates in affected and less affected states. In this regard, it is hard to conclude that the lower level of CU lending is explained by the higher interest rates in the most affected states.

Early analysis by Li et al. (2020) and Acharya and Steffen (2020), shows that a better metric for lending during the pandemic is the drawdown in loan commitment. We the ask whether CU borrowers utilize their existing loan commitments (i.e. credit lines) to obtain loans during the Covid-19 pandemic when CU might be reluctant to issue new loans. To do so, we rerun our baseline regression utilizing *Ln(Unused Commitment)*, measured as the natural logarithm of unused loan commitments, as our new dependent variable. We posit that if borrowers tend to tap in their existing credit lines during the pandemic, there would be a decrease in unused loan commitment. The results, reported in Column (1) in Panel B of Table 3, show that the coefficients for both *IR Cut* and *IR Cut* × *Affected* are not significant, ruling out this assumption.

Dursun-de Neef and Schandlbauer (2020) find that bank deposits increase in countries that suffer a lot from the pandemic since bank customers are "forced" to save due to lower spending demand and higher unemployment caused by the pandemic. Therefore, we test whether there is any link between deposit and lending value in CU in the most affected states. Our results, reported in Column (2) in Panel B of Table 3, show that deposit actually increases in more affected states (i.e., the sum of coefficients for *IR Cut* and *IR Cut* × *Affected* is 0.0586 = 0.0686 – 0.0100 and significant), but the increase is not as much as that of less affect states (i.e. the coefficient of *IR Cut* × *Affected* is negative and significant). Thus, we rule out the proposition that the reduction in lending is explained by a proportional reduction in deposit.

Table 3
Additional analyses.

Panel A: The impact of the interest rate cut on credit union interest rates of different types of loans during the Covid-19 pandemic

	Unsecured credit card	Other unsecured loan	Student loan	New vehicle	Used vehicle	Other secured loan	First lien Real estate	Junior lien Real estate	Other Real estate	Commercial secured	Commercial unsecured
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
IR Cut	0.0111	−0.4317***	−0.0374***	−0.0558*	−0.0604*	−0.0035	−0.1212***	0.6384	0.0158	−0.0316	−0.0598**
	(0.1113)	(0.1070)	(0.0135)	(0.0326)	(0.0365)	(0.0584)	(0.0416)	(0.8016)	(0.0380)	(0.0212)	(0.0301)
IR Cut × *Affected*	−0.1589	0.3321***	−0.0711	0.0780	−0.0003	−0.0498	0.0040	−0.2198	−0.0379	0.0118	0.0079
	(0.1173)	(0.1150)	(0.0620)	(0.0733)	(0.0668)	(0.1432)	(0.0613)	(0.1864)	(0.0507)	(0.0486)	(0.0465)
Observations	3228	3228	3228	3228	3228	3228	3228	3228	3228	3228	3228
Control variables	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
CU fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Panel B: The impact of the interest rate cut on deposit and unused commitment during the Covid-19 pandemic

	Ln(Unused Commitment)	*Ln(Deposit)*
	(1)	(2)
IR Cut	0.0251	0.0686***
	(0.0185)	(0.0029)
IR Cut × *Affected*	−0.0014	−0.0100**
	(0.0206)	(0.0048)
Observations	3228	3228
Control variables	YES	YES
CU fixed effects	YES	YES

Note: This table provides results of several additional analyese to examine the impact of interest rate cut on credit union lendings during the Covid-19 pandemic. Panel A shows the results of the models to estimate the effect of interest rate cut on interest rates of different types of loans offered by credit unions during the Covid-19 pandemic (from Q1-2020 to Q1-2021). The dependent variables are the interest rates of different types of loans. Panel B shows the results of the models to examine the impact of interest rate cut on unused commitment, measured using natural logarithm of unused loan commitment (Column 1) and deposits, measured using the natural logarithm of total shares and deposits (Column 2). *IR Cut* is a dummy variable, equals one from Q2-2020 onward, and zero otherwise. *Affected* is a dummy variable which equals one if the credit unions locate in states that are consistently ranked in the top quartile regarding the number of reported deaths by Covid-19 scaled by state area, and zero if credit unions locate in states that are consistently ranked in the bottom quartile. Robust standard errors are in parentheses. ***, **, and * denote significant levels at 1%, 5%, and 10% respectively.

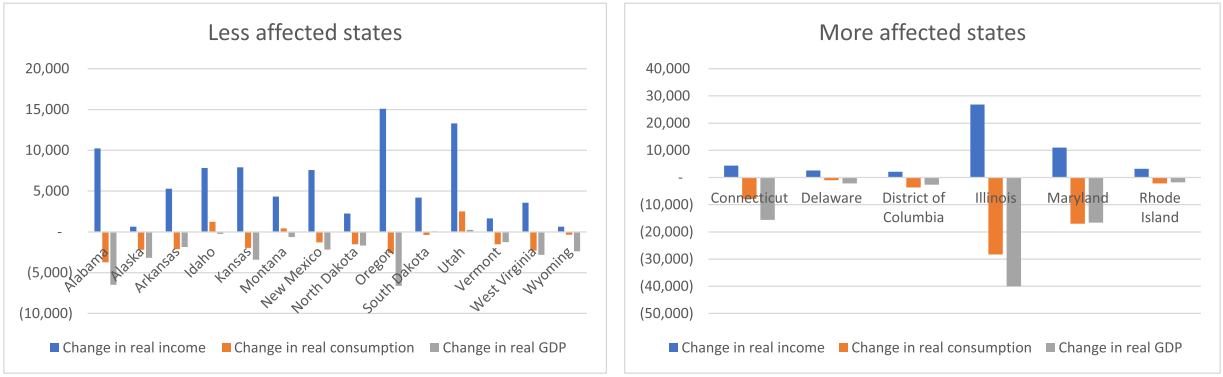

Fig. 2. The changes in real consumption, real income, and real GDP across US states. This figure presents the changes in personal real income (blue columns), real consumption (orange columns), real GDP (gray columns) between the two years 2019 and 2020 in states that are less and more affected by the Covid-19 pandemic. All figures are in millions of constant (2012) USD. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.).

We also investigate whether our main results can be explained by any structural changes in the economy, for example, changes in individual behaviors under the impact of the Covid-19 pandemic. In Fig. 2, we illustrate personal real income (blue columns), real consumption (orange columns), and real gross domestic product (GDP) (gray columns) in 2019 and 2020 in states that are less and more affected by the Covid-19 pandemic. These data are retrieved from the Bureau of Economic Analysis – US Department of Commerce' website (https://www.bea.gov/). We find that the changes in real income are relatively similar among more and less affected states. However, in more affected states, people tend to have a larger reduction in consumption. This reduction in consumption is also reflected in the larger decreases in GDP observed in those more affected states. This finding is consistent with Dong et al. (2021) who conclude that people permanently reduce their consumptions during the pandemic due to social distancing. It also echoes with Horvath et al. (2021) who find a reduction in credit card spending due to the pandemic itself and banks' "flight-to-safety" strategy by reducing credit limits. This provides an explanation for our conclusion, that is, in more affected states, personal consumptions tend to decline, leading to less demand for lending. This outweighs the impact of lower interest rate, making the interest rate policy less effective in those states. This conclusion aligns with Hristov et al.'s (2014) argument that interest rate policy can be less effective during crisis periods due to a structural shock in the economy.

4. Conclusions

This paper concludes that the interest rate cut can enhance CU lending in states that are less affected by the Covid-19 pandemic. However, similar impact is not documented for CU lending states that are badly affected. This means that the policy cannot benefit the targeted audience (those heavily affected by Covid-19), whilst being taken advantages by those who are less affected by the pandemic. This finding is of great use for regulators, who should consider tailoring policies that can benefit those who are in real need of government support. Our study also promotes a trend in future research that seeks to understand the contexts when studying the economic impact of a policy.

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