



BERKELEY ECONOMIC REVIEW PRESENTS

# equilibrium



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Mission Statement: In Berkeley Economic Review, we envision a platform for the recognition of quality undergraduate research and writing. Our organization exists to provide a forum for students to voice their views on current economic issues and ultimately to foster a community of aspiring economists.

Disclaimer: The views published in this magazine are those of the individual authors or speakers and do not necessarily reflect the position or policy of Berkeley Economic Review staff, the UC Berkeley Economics Department and faculty, or the University of California, Berkeley in general.

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# From the Editors' Desk

Dear Berkeley Economic Review Readers,

It is with great enthusiasm and pride that I welcome you to the Spring 2023 issue of the Berkeley Economic Review Magazine, an undertaking dedicated to exploring the dynamic world of economics during a post-pandemic era. This project has been a labor of love for our dedicated team of editors, writers, and contributors, and we are thrilled to share it with you finally!

Economics is a discipline that touches every aspect of our lives, from the choices we make as consumers to the policies that shape our societies. It is a field that bridges the gap between theory and practice, providing us with the tools to understand and navigate the complex forces that drive our global economy. At the Berkeley Economic Review, we aim to bring the fascinating world of economics to a wider audience, making it accessible and engaging for all.

In the pages of this magazine, you will find a diverse range of articles and features that delve into the most pressing economic issues of our time. Whether you're interested in the impact of technology and artificial intelligence on the job market, the challenges of income inequality, the intricacies of international trade, or the latest innovations in economic research, we have something for you. Our contributors are deeply passionate about their respective fields, and their insights promise to spark your curiosity and deepen your understanding of the economic world around us.

At the Berkeley Economic Review of UC Berkeley, we are committed to maintaining the highest standards of editorial excellence and intellectual rigor. Each article in this magazine has undergone a rigorous review process to ensure accuracy, clarity, and relevance. We strive to provide you with content that is not only informative but also thought-provoking, encouraging you to engage with the issues and ideas presented.

As we embark on this exciting journey together, we invite you to be an active part of the Berkeley Economic Reviews community. Share your thoughts, questions, and feedback with us. Join the conversation on our website and social media platforms, and let us know what topics you would like us to explore in future issues.

In closing, I want to express my gratitude to our dedicated team and all those who have supported us in bringing the Spring 2023 magazine to life. We hope that Berkeley Economic Review will become or continue to be a trusted source of economic insights and a forum for meaningful discussions in the years to come.

Thank you for joining us on this exciting adventure. We look forward to engaging with you and exploring the ever-evolving world of economics together.

Warm regards,  
Aaron Kyle Wang  
Editor-in-Chief  
Berkeley Economic Review

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# Communication Costs and Coauthor Networks: Evidence from COVID-19 Lockdowns

Written By Aneesh Kudrimoti

## Abstract:

Collaboration is a critical component of productivity and innovation in economics research. Despite its importance, there exists little to no literature examining how lockdown measures have impacted collaborative practices in the field. In this study, I aim to investigate the effects of stay-at-home orders implemented during the COVID-19 pandemic on coauthorship networks in economics research. More specifically, I look to examine the extent to which a range of pandemic-related factors have influenced the average distance between coauthors: a proxy for collaboration. These factors include the growth of virtual communication platforms, heightened gender inequality, challenges in conducting fieldwork, and the incentive to collaborate with researchers from different universities. A stratified random sample of 200 NBER working papers issued before and after the implementation of stay-at-home orders was collected and analyzed. A series of regression models were then used to examine the impact of the aforementioned factors across the pandemic. However, while point estimates suggest economically important heterogeneity in the pandemic's effects on coauthor proximity, estimates in the random sample were not statistically significant, thus motivating further investigation.

## (1) Introduction:

### (1.1) Background/Motivation of Study:

A sizable body of research has been conducted on the negative implications of the pandemic on productivity, innovation, and mental health in academic research. This is not surprising as initial lockdown restrictions forced many research institutions to shut down or reduce their operations, resulting in delays in existing research and a sudden shift to remote work. However, little research has been done on the flip-side of this phenomenon. Running parallel to the perceived negative effects of the pandemic on research is the rapid growth of video-conferencing platforms like Zoom. To put this into perspective, between 2019 and 2020, Zoom meeting participants increased nearly 300% (Statista, 2022). The growth of video-conferencing certainly indicates that human beings have adapted to the challenges of the pandemic by embracing new technologies in order to stay connected and continue working despite social distancing measures. In relation to academic research, however, several questions arise:

- (1) Has the shift towards virtual communication restored collaboration to pre-pandemic levels, or has it enabled even greater collaboration and productivity amid the ability to overcome geographic barriers?
- (2) Have stay-at-home orders and a transition towards the use of virtual communication for work incentivized researchers to collaborate outside their affiliated university or institution?
- (3) To what extent do factors such as gender inequity and limitations in conducting in-person fieldwork mitigate this potential increase in collaboration?

In this paper, I seek to address these questions, with a focus on collaboration networks in economics research. I chose to focus on this field in particular because it frequently involves collaboration across academic institutions and countries, making it an ideal framework to examine the effects of social-distancing measures on collaboration networks amid geographical barriers. My initial hypothesis is that collaboration in Economics research as a whole has transformed after the pandemic due in part to the growth of virtual communication platforms, which have allowed researchers to expand coauthorship networks. This is because geographic barriers no longer present an issue and because researchers no longer experience the same incentive to work within their school or workplace. Moreover, I believe that gender inequality and complications in conducting fieldwork will play in part in mitigating this effect through the delay or cancellation of projects, hence decreasing overall productivity and collaboration. I am curious, however, to examine whether these adverse effects are large enough to completely nullify any positive effects.

### (1.2) Literature Review:

To explore the research questions defined above as well as my initial hypothesis, I want to preface some of the existing literature in the field. Although the authors in the literature mentioned primarily examine the effect of lockdown measures on productivity in academic research, rather than collaboration, their research still offers valuable insight into the multiple ways the pandemic has shaped research and impacted researchers. This literature review is structured into three sections: productivity in the sciences, productivity in economics research, and gender disparities in research—all in relation to the pandemic. In each section, I will summarize several relevant findings as well as limitations that my research seeks to address.

#### (1.2.1) An overview of literature on productivity in S.T.E.M research:

Much of the research done on fields outside of economics—largely in S.T.E.M fields—explores two contrasting effects of the pandemic on research output. On one end, the pandemic has disrupted the ability to conduct lab-based scientific work, which is essential to advancing research in the sciences. As one paper published in Springer Nature highlights, the closure of labs and lab-based scientific research activities during initial lockdown measures has not only hindered research progress and projects, but also created additional pressures related to indirect costs (Radecki & Schonfield, 2020). These indirect costs include universities' pressure to secure stable revenue streams due to diminishing flexibility in federal funding, and the challenge of supporting existing research due to the lack of academic instruction that often subsidizes research. As outlined in a paper published by Springer Nature, the indefinite timeline for continuing research, coupled with unstable funding sources, has taken a toll on scientists. Postgraduate and early career researchers, in particular, have been deprived of networking and publishing opportunities (Fosci et al, 2020). Although the literature mentioned reinforces the pandemic's

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negative effects on research output, an article published by the NIH suggests that the pandemic has led to a massive influx of scientific publications on COVID-19, which currently accounts for 10-20% of current biomedical investigation (Harper et.al, 2020). Thus, output in the sciences has paradoxically both been drastically limited by the pandemic and expanded due to the necessity of medical research to limit the spread of Covid-19. The literature provides valuable insights into factors such as limited capabilities and opportunities for researchers, funding issues, and general uncertainty that have affected research productivity in academia and, as a result, collaboration during the pandemic. Moreover, it further displays the push-pull effect of various factors on academic research that make it difficult to tell whether productivity and collaboration in academic research as a whole is trending upwards or downwards in recent years. While differences in collaboration amongst early-career researchers and postgraduates are not explicitly examined in this paper, this interaction may have potentially impacted the estimated coefficients in the initial model I constructed (see 2.2). The literature has mainly relied on ethnographic evidence to examine factors affecting productivity and collaboration. In this paper, I apply a causal inference approach to build on the existing ethnographic evidence.

### **(1.2.2) An overview of literature on productivity in economics research:**

In a recent study published in the Oxford Academic, Samuel Kruger, a professor of Finance at the University of Texas, Austin, points out how it is difficult to predict whether stay-at-home orders will have a positive or negative effect on economics research. On one hand, Kruger notes that economics research traditionally heavily relies on in-person seminars, conferences, and informal office conversations, many of which came to a halt in March 2020. On the other hand, he describes how Covid-related challenges present new opportunities for economics research particularly in fields like healthcare and public economics. This positive effect is further increased due to how economics research generally involves the use of existing datasets, as opposed to data collected in a lab or through fieldwork, which makes it an ideal candidate for efficient teleworking. To accurately measure the direction of this change, Kruger examined a set of working papers posted on the Social Science Research Network (SSRN) by faculty at top-50 U.S. economics and finance departments. To quantify production, they measured the frequency at which papers were posted to the SSRN by faculty, and used a difference-in-differences model to determine a statistically-significant change in research output before and after the pandemic. The key finding is that following the onset of COVID-19, research production in economics and finance (measured by the posting of working papers) increased by 29%. This figure shows the resilience and potential evolution of economics research in the face of the pandemic, which is somewhat of a contrast to the S.T.E.M. fields discussed above.

The most relevant finding from his paper was an “increased reliance on past coauthorship networks” within faculty and “larger production gains for authors that are more central to the network”. This finding is useful in that it partially addresses my first research question: coauthorship networks may have not expanded drastically after the pandemic. Yet, this conclusion does not provide insight into how collaboration dynamics may have shifted during the pandemic. In other words, it does not detail whether researchers in the study

potentially overcome geographical barriers to maintain their co-author networks, which is especially relevant given the unique circumstances of remote work and reduced in-person interactions. In my paper, I mainly focus on incorporating this potential shift in collaboration dynamics by defining a metric that can measure collaboration in relation to geographical barriers.

It is also important to acknowledge the potential negative impact of the pandemic on subfields within economics that require extensive fieldwork, such as development economics. While empirical work in economics typically relies on existing datasets, development economics has a rich history of conducting field research. Research in this sub field often involves taking structured visits to the field to better understand the economic environment being studied and to clarify aspects of large-scale data sets through sampling and survey methods (Udry, 2003). With this in mind, it would make sense that an inability to conduct fieldwork would hamper productivity in the field as researchers are no longer able to engage in these crucial data collection processes. This has certainly been the case for researchers in other social sciences, like political science and psychology, that often make use of fieldwork as a component of their research. For example, Aidan Motliff, a PHD Candidate in Political Science at MIT, describes how her work on political violence in India often relies on the ability to conduct interviews in-person and the support of her Indian colleagues, both of which have been put on halt due to lockdown measures (Krause et.al, 2021). Dr. Tapiwa Madimu, an economics historian at Rhodes University, states that researchers face a difficult decision: to cancel or postpone projects or to continue despite potential health risks (Madimu, 2021). Overall, ethnographic evidence suggests a negative impact on collaboration in these fields. In this paper, I aim to corroborate this existing evidence through a more quantitative approach. This approach may not only reveal effects within development economics but also shed light on other subfields that heavily rely on fieldwork.

### **(1.2.3) An overview of gender disparities in academic research:**

A common theme of the literature I examined was a striking gender disparity in research production during the pandemic. In the NIH journal article mentioned in (1.2.1), the authors discuss how early analysis on publications in-and outside of scientific research have shown that “female academics are publishing less and starting fewer research projects than their male peers.” The authors specifically point to the increased familial and childcare responsibilities that women are facing during the pandemic due to having to work from home. In a related article published in The Guardian, the authors interview several female academics in the UK to gain insight into this potential gender gap. One female academic explains this disparity in terms of the historic wage gap, saying “because she earns less, and can be more flexible about when she works, the bulk of the childcare falls to her.” Both articles provide some qualitative evidence on gender disparity in research production through anecdotal evidence from female academics, but are limited in that they don’t show a statistically significant difference between production across males and females. In the paper mentioned in (1.2.2), Kruger incorporates this perceived difference into their modeling to limit potential noise in his regression model. The key finding from the paper was that “women between the age of 35 and

49 experienced a production increase that is 0.31 papers per year smaller than men in the same age group, a difference that is statistically significant at the 1% level.” In addition, researchers found a mean 6% increase for women aged 35–49 compared to a mean 32% increase for men aged 35–49 before and after the pandemic. Both of these statistics, again show a sizable and statistically significant change in production sectioning on gender. Overall, this literature provides sufficient evidence that gender disparities are likely associated with decreased research productivity. However, the anecdotal evidence detailed in the NIH article along with the empirical evidence presented by Kruger, are not sufficient enough to draw conclusions about changes in collaboration practices within economics. In this paper, I seek to address this shortcoming by utilizing a regression model with an interaction term to explain gender disparities across the pandemic. I aim to establish a causal relationship between pandemic-induced gender inequity and collaboration, and how this has potentially masked the neutral/positive trend in economics productivity described by Krueger.

## (2) Data Collection and Research Design:

### (2.1) Data Cleaning and Collection:

My paper primarily relies on the metadata of the NBER working paper series, which contains details such as titles, coauthors, abstracts, and dates of NBER working papers from 1973 to 2023, and is publicly accessible. NBER working papers are particularly well-suited for this study due to three key reasons: (1) they are working papers, which means the actual collaboration necessary for the paper occurred close to their publication date, rather than years earlier, (2) they are authored by at least one NBER affiliate, thereby ensuring their credibility, and (3) all the papers are related to economics, which is the main focus of this research. I was able to access this data thanks to a blog article written by economist Alex Albright. This article focuses on publication metadata of NBER working papers and provides some intriguing descriptive analysis of this data (Albright, 2021).

Given that nearly 1200 working papers are published in the NBER working series every year, the data set contains nearly 33,000 entries of 41 variables. As such, I sought to clean the raw data in R-Studio to obtain the necessary information related to my overarching research question.

As mentioned in Section 1.1, I am primarily looking to see whether the introduction of lockdown measures, and thus a rise in virtual communication, has brought collaboration back to pre-pandemic levels or possibly facilitated even greater collaboration and productivity. I thus defined a metric that could quantify both a change in collaboration and the geographical barriers introduced by lockdown measures — the average pairwise distance between coauthors. Formally, this measure is:

$$\text{avgdistance}_{km} = \beta_0 + \beta_1(\text{pandemic})$$

In the measure above,  $c_1$ ,  $c_2$ ,  $c_3$  represents each coauthor on a working paper. I filtered the data in the raw dataset to include only papers with exactly 3 coauthors, so as to simplify calculations for this metric. Also, the ordering of each coauthor is

essentially arbitrary in the equation, and so while the first coauthor listed in each paper has made the most contribution to that paper, it is not of relevance when calculating the distance between coauthors. The exact calculation for the pairwise distance between a particular set of coauthors is the Haversine distance formula, which computes the distance between latitude-longitude pairs for a particular location while accounting for the curvature of the earth. The use of this formula was to ensure calculations were as accurate as possible.

The potential implications of this metric are twofold: One possible implication is that due to lockdown measures, NBER affiliates may no longer be able to work with colleagues in close proximity. As a result, their communication networks may expand outside of the university where they work and potentially reach other universities. This is because the cost of communication with a researcher at their university becomes virtually equal to the cost of communicating with a researcher in any other location, as proximity is no longer a factor. This would be reflected as a higher expected distance between coauthors after lockdown measures are instituted. On the other hand, there are factors mentioned in the literature—such as gender disparities in pandemic-era familial and childcare responsibilities, diminished in-person interactions at events such as conferences, and a reduced ability to conduct research in fieldwork-driven subfields—that have the potential to actually diminish collaboration as a whole. This would be reflected as a lower expected distance between coauthors after the pandemic. Thus, this metric accounts for both possibilities and provides a strong proxy for collaboration.

To obtain the data to compute this metric, I cleaned the raw data set to include the name of each paper in the data set, a set of coauthors (each in their own column), and the issue date split into three columns containing year, month, and date. Once I did this, I sectioned off the data set into a set of papers published between 2016 and 2019 and a set of papers published between 2019 and 2023. I then randomly selected a set of 100 papers within each group. Unfortunately, the coauthor affiliation and coauthor gender data was not contained in the dataset I was working with, nor could I find this data in any other publicly available source. I thus had to manually enter the affiliation and gender of each coauthor, as well as the JEL categorization of that paper for each set. The JEL Classification is a comprehensive categorization of fields that nearly all papers fall under (e.g. Category O corresponds to Economic Development, Category R corresponds to Urban Economics, etc.) and is noted in the bibliography. All of this metadata could be found on the first or second page of each working paper as such:

#### ABSTRACT

Using newly-constructed spatially-disaggregated data for London from 1801-1921, we show that the invention of the steam railway led to the first large-scale separation of workplace and residence. We show that a class of quantitative urban models is remarkably successful in explaining this reorganization of economic activity. We structurally estimate one of the models within this class and find substantial agglomeration forces in both production and residence. In counterfactuals, we find that removing the entire railway network reduces the population and the value of land and buildings in London by up to 51.5 and 53.3 percent respectively, and decreases net commuting into the historical center of London by more than 300,000 workers.

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Once I recorded the university of each coauthor, I computed the average pairwise distance between each coauthor in kilometers using the metric defined above. I encoded whether or not a paper had at least one female coauthor as binary variable gender (1 = has at least one female coauthor, 0 = no female coauthors). I encoded the field of each paper as a set of binary variables corresponding to its JEL classification. Since papers typically fell into multiple JEL categories, I usually chose the most common subcategory listed or in the case there were multiple unique categories, I chose the one that was most fitting based on what I could gather from the abstract. In my analysis, while I encoded the paper for nearly all JEL categories, I ended up only examining whether or not a paper fell under development economics. This is because I chose development economics to encompass the effects of fieldwork-heavy subfields on collaboration based on the literature mentioned above. I also converted the year column to a binary variable pandemic which represents whether the paper was written before or after April 2020 (1 = after, 0 = before), as this is typically when lockdown measures were put into place (Link) I then merged the two separated data sets back together into one dataset so I could conduct regression analysis. Here is a look at the first few entries of the cleaned data set used in my analysis (located on the bottom of the page).

## (2.2) Research Design + Modeling:

To reiterate, the main purpose of this study is to answer the following questions:

- (1) Has the shift towards virtual communication restored collaboration to pre-pandemic levels, or has it enabled even greater collaboration and productivity amid the ability to overcome geographic barriers?
- (2) To what extent do factors such as gender inequity and limitations in conducting in-person fieldwork mitigate this potential increase in collaboration?

To gain some initial insight into the first question, I constructed a simple regression of the average distance between co authors on pandemic.

$$\text{avgdistancekm} = \beta_0 + \beta_1(\text{pandemic})$$

The interpretation of the intercept term  $\beta_0$  is the average distance between coauthors before the pandemic. The interpretation of the coefficient for pandemic,  $\beta_1$ , is the expected change in the average distance between coauthors after the pandemic. Since pandemic is a binary variable, this is essentially identical to conducting a t-test for difference in means. The regression estimates from this model are obviously subject to omitted variable bias considering factors mentioned in the literature such as gender disparities, field, status of coauthors, funding, etc.. However, the 'biasedness' of the  $\beta_1$  coefficient is actually useful in that it can demonstrate the degree to which positive effects of the pandemic on collaboration, such as the increased use of virtual communication platforms in collaborative practices, has been offset by the aforementioned factors. Isolating the degree to which gender disparities or the ability to collaborate have affected collaboration across the pandemic, can not be extrapolated from this regression. I thus construct two additional regressions to capture these effects.

$$\text{avgdistancekm} = \beta_0 + \beta_1 \times \text{pandemic} + \beta_2 \times \text{gender} + \beta_3 \times (\text{gender} \times \text{pandemic})$$

In the above regression, I used an interaction term to estimate the causal effect of gender disparities on collaboration after the institution of lockdown measures.  $\beta_0$ ,  $\beta_1$  and  $\beta_2$  serve as control variables. The interpretation of  $\beta_0$  is the expected distance between male coauthors before the pandemic. The interpretation of  $\beta_1$  is the change in the expected distance between male coauthors after the pandemic. The interpretation of  $\beta_2$  is the difference in the average distance between female and male coauthors before the pandemic. Finally,  $\beta_3$  is the coefficient of the interaction term of gender and pandemic. This indicator variable is essentially turned on for papers with at least one female coauthor that have been produced after the pandemic and thus measures the effect of gender disparities across the pandemic. I expect the coefficient for  $\beta_3$  to be large and negative as the gender disparities have become larger after the pandemic. I would also expect the coefficients of the male control variables to be positive and for  $\beta_2$  to be negative but somewhat smaller than  $\beta_3$ . If  $\beta_2$  was larger than or close to equivalent to  $\beta_3$ , it would indicate that gender disparities are largely pre-existing and independent of whether or not a paper was published

| NBER Working Paper Metadata |                     |                        |                    |                                 |                                     |                            |               |          |             |        |
|-----------------------------|---------------------|------------------------|--------------------|---------------------------------|-------------------------------------|----------------------------|---------------|----------|-------------|--------|
| paper                       | co.author1          | co.author2             | co.author3         | uni1                            | uni2                                | uni3                       | avgdistancekm | pandemic | development | gender |
| w25047                      | Stephan Hebllich    | Stephen J Redding      | Daniel M Sturm     | University of Bristol           | Princeton University                | London School of Economics | 7046          | 0        | 1           | 0      |
| w26492                      | Xiaojia Bao         | Sebastian Galiani      | Kai Li             | Xiamen University               | Xiamen University                   | Xiamen University          | 0             | 0        | 0           | 0      |
| w25182                      | Ekaterina Jardim    | Mark C Long            | Robert Plotnick    | University of Washington        | University of Washington            | University of Washington   | 0             | 0        | 0           | 0      |
| w25155                      | Bernhard Michel     | Caroline Hambaye       | Bart Hertveldt     | Belgian Federal Planning Bureau | Belgian Federal Planning Bureau     | Bart Hertveldt             | 0             | 0        | 0           | 0      |
| w23972                      | Margherita Borella  | Mariacristina De Nardi | Fang Yang          | University of Turin             | Federal Reserve Bank of Minneapolis | Louisiana State University | 5857          | 0        | 0           | 0      |
| c13943                      | Christine L Carroll | Colin A. Carter        | Rachael E. Goodhue | CSU Chico                       | UC Davis                            | UC Davis                   | 100           | 0        | 0           | 0      |
| w24722                      | Miles S. Kimball    | Matthew D Shapiro      | Tyler Shumway      | University of Colorado, Boulder | University of Michigan              | University of Michigan     | 585           | 0        | 0           | 0      |
| w25414                      | Shai Bernstein      | Abhishek Dev           | Josh Lerner        | Stanford University             | Harvard University                  | Stanford University        | 1443          | 0        | 0           | 0      |
| w25975                      | Amy Finkelstein     | Matthew Gentzkow       | Heidi L Williams   | MIT                             | Stanford University                 | MIT                        | 1471          | 0        | 0           | 0      |
| w24978                      | Mel Win Khaw        | Ziang Li               | Michael Woodford   | Duke University                 | Princeton University                | Columbia University        | 414           | 0        | 0           | 0      |

after the pandemic.

$$\text{avgdistancekm} = \beta_0 + \beta_1 \times \text{pandemic} + \beta_2 \times \text{development} + \beta_3 \times (\text{development} \times \text{pandemic})$$

In the final regression, I use an interaction term to capture the causal effect of complications in fieldwork due to the pandemic on collaboration. The underlying theory behind including this interaction term is that due to the pandemic, NBER affiliates whose research is in development will no longer be able to travel to field sites, and so authors from local universities where fieldwork is conducted will no longer appear in the list of coauthors for a particular paper in development. This phenomenon would be reflected by an decrease in the average distance between coauthors after the pandemic. As a reminder, I am treating papers classified under development economics as an indicator for field-specific effects.  $\beta_0$  represents the average distance between coauthors before the pandemic for fields outside of development economics, which I treat as fields that do not typically involve a great deal of fieldwork.  $\beta_1$  represents the difference in the average distance between coauthors after the pandemic for fields outside of development economics.  $\beta_2$  represents the difference in the average distance between coauthors within and outside of development economics before the pandemic.  $\beta_3$  is the main focus of this model as it is a causal estimator for the effect of the pandemic on collaboration within development economics.

### (3) Results and Discussion:

#### (3.1) Results:

The results of the series of regressions are detailed below:

Table 1:

|                         | average distance between coauthors |                           |                             |
|-------------------------|------------------------------------|---------------------------|-----------------------------|
|                         | avgdistancekm                      |                           |                             |
|                         | (1)                                | (2)                       | (3)                         |
| pandemic                | -193.427<br>(392.960)              | -494.493<br>(536.503)     | -248.021<br>(397.102)       |
| gender                  |                                    | -395.768<br>(555.189)     |                             |
| pandemicXgender         |                                    | 648.966<br>(791.857)      |                             |
| development             |                                    |                           | 2,940.478***<br>(1,046.539) |
| pandemicXdevelopment    |                                    |                           | -388.294<br>(1,374.507)     |
| Constant                | 2,706.070***<br>(276.458)          | 2,896.038***<br>(384.646) | 2,500.237***<br>(276.888)   |
| Observations            | 198                                | 198                       | 198                         |
| R <sup>2</sup>          | 0.001                              | 0.005                     | 0.078                       |
| Adjusted R <sup>2</sup> | -0.004                             | -0.011                    | 0.063                       |
| Residual Std. Error     | 2,764.576 (df = 196)               | 2,773.724 (df = 194)      | 2,670.212 (df = 194)        |
| F Statistic             | 0.242 (df = 1; 196)                | 0.317 (df = 3; 194)       | 5.453*** (df = 3; 194)      |

Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

#### (3.2) Discussion of Results:

For the first model, we can interpret the coefficient on pandemic ( $\beta_1$ ) as the expected decrease in the average distance between coauthors is approximately 193 km after the pandemic. In other words, this corresponds to around a 7.6% decrease in collaboration after the pandemic. This likely signals that factors like the negative impact of gender disparities and complications in the ability to conduct fieldwork have outweighed positive factors mentioned in the literature, such as innovation

generated from Covid-19 related issues or the ability to continue research in subfields that typically don't involve heavy amounts of fieldwork. Note that the t-stat for this coefficient is 0.49, which makes it difficult to generate conclusions from the results. This problem is generated by the high standard error in the coefficients, which can be attributed to the sample size of 200 in the study. For the second model, the estimated slope coefficient on the interaction term is positive. This is contrary to my hypothesis, as my intuition was that gender inequity would become more pronounced after the pandemic relative to before the pandemic. Although, the slope coefficient on gender ( $\beta_2$ ) is already relatively large and negative, which could potentially indicate existing gender differences in publications were already an issue before the pandemic and thus while gender disparities may have appeared to gone down, they are still large in effect size. To put this into perspective, papers coauthored by at least one female researcher after lockdown measures were instituted showed a predicted decrease in the average distance between coauthors by 241 km, compared to research conducted solely by male coauthors before the pandemic. This amounts to around a 10% decrease in collaboration for female coauthors relative to their male peers. Again, results must be taken with a grain of salt as the coefficients on these models as the test statistic for our interaction term is 0.81 and 0.71 for gender, neither of which meet the threshold for statistical significance at the 5% level (1.96). For the third model, the estimate of the slope coefficient on the interaction term ( $\beta_3$ ) is negative, which aligns with our hypothesis that collaboration as a whole within development economics will have decreased after the pandemic. We can also examine the partial effect of the pandemic on Economics as a whole, which can be done by taking the partial derivative with respect to the variable pandemic of our population regression function and plugging in our coefficient estimates. Taking our partial derivative gives us the partial effect of  $\beta_1 + \beta_3 * (\text{development})$ . Since both are large and negative in effect size (-248 and -343 km respectively), there is a diminishing effect on collaboration for fields outside of development after the pandemic, and an even more severe effect for research within development economics. This corresponds to a 11 percent decrease in collaboration for non-fieldwork heavy subfields of Economics and a nearly 30 percent decrease for fields involving a great deal of fieldwork. This sizable decrease in collaboration confirms my hypothesis that the inability to conduct fieldwork diminishes collaboration in Economics both within development economics and in other subfields. It likely appears that neither a shift towards virtual communication nor an incentive to collaborate with research from other universities was enough to promote increased collaboration, even in fields where work revolves around existing data. Note that statistical significance of our estimates is a slight issue here as only our coefficient for development is highly statistically significant. The interpretation of this coefficient is still pretty interesting as its strong, positive effect size of around (2940 km) implies that before the pandemic, collaboration was much more integral to development economics than it was to other fields.

To improve this study, a larger sample size is needed. As not all the paper metadata I needed was available on the NBER website, REPEC, EconLit or any other database, it became difficult to manually collect the metadata needed for a sufficient sample size. Ideally, a random sample of around 1000 would be needed to produce more statistically significant estimates on the slope coefficients. To accomplish this, it would be up

to NBER to update coauthor data available, however this is understandably a privacy issue. Another alternative would be a web scraping algorithm that is authorized by the databases mentioned above. With regards to the model, it also may be beneficial to test non-linear models to account for outliers or to simply make interpretations of the coefficient more comprehensible. For example, a log transformation of  $\text{avgdistancebetweencoauthors}$ , would make the slope coefficients refer to a percent change in the outcome variable as a 1% increase in distance between coauthors is much easier to interpret than a 1000km increase in the distance between coauthors. Overall, a more concrete understanding of pandemic effects requires a larger sample size and perhaps some fine-tuning for our model.

**(4) Conclusion:**

In this study, I sought to determine potential causal effects of lockdown measures instituted during the Covid-19 pandemic and collaboration in economics Research. To investigate this, I utilized a publicly available record of NBER working papers from 1973 to present-day. After dividing up the set of working papers into those published between 2016 and 2019 and 2019 and 2023 and taking a random sample of 10- papers within each group, I recorded data on the universities, gender, field, and distance between coauthors for each individual paper. I then utilized a series of regressions to determine the causal effects of lockdown measures accounting for potential gender and field-related differences in research collaboration. While point estimates suggest economically important heterogeneity in the pandemic's effects on co-author proximity, a larger sample size is needed to obtain statistically significant results.

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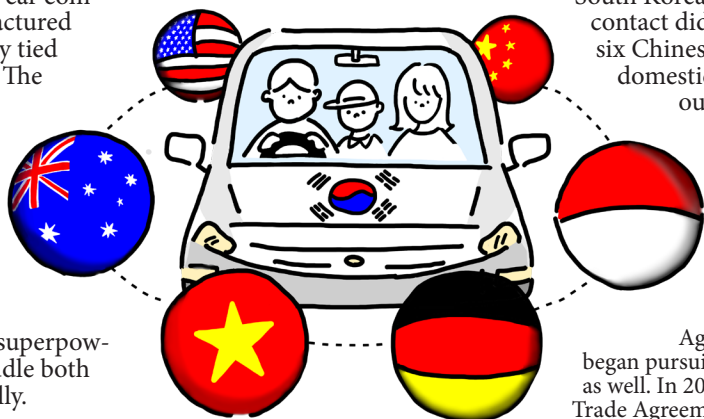
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# Korea Continues to Be Stuck Between a Rock and a Hard Place

Written By Nita Sabouri

On August 16th, 2022, Congress approved the Inflation Reduction Act (IRA), a new federal law that hopes to (you guessed it) reduce inflation. But, because this is Congress, several additional stipulations were added as riders before the bill passed. Along with reducing inflation, the act reduces the federal deficit, lowers prescription drug prices, fights climate change, and increases investment in domestic energy production. That last part is important because one of the methods through which the IRA subsidizes domestic energy production is by providing a \$7,500 federal rebate for electric vehicles that contain batteries that were manufactured within the U.S. This part of the IRA is meant to boost sales for American EV manufacturers like Tesla, Ford, and General Motors. However, it has also been interpreted as a provocation towards China, since six out of the top ten EV battery makers in the world are Chinese companies. Most of the discussion about this aspect of the IRA has focused on how it escalates the trade war between China and the U.S.. Meanwhile, one country has gone largely overlooked: South Korea. Many Korean car companies use Chinese-manufactured batteries and are also closely tied to the Korean government. The new IRA provisions have forced Korea to choose between its economic relationship with China and potentially losing the American market. That being said, Korea is no stranger to navigating the tenuous relationship between the two opposing superpowers, often caught in the middle both geographically and politically.



Even before Korea became divided, its geographical location between China and Japan made the peninsula a frequent target for invasion. The First Sino-Japanese war was fought from 1894 to 1895 as China and Japan battled over influence in Korea, and it is a stark example of how Korea has historically been caught in the middle of opposing powers that are much larger and much more powerful. However, the ties between Korea and China go far deeper than military alliances. As an East Asian country, Korea has many cultural similarities to China, with many traditions tracing back to Chinese practices. Even the official language of Korea, Hangeul, was developed using traditional Chinese as its basis. Moreover, during World War II, the two countries were both victims of Japanese imperialism and war crimes resulting in mutual solidarity in opposition to Japan.

However, the relationship between the two countries changed once the Korean War began in 1950. During the Korean War, China backed the communist Democratic People's Republic of Korea (DPRK) while the U.S. supported the capitalist Republic of Korea (ROK) due to their respec-

tive political alignments. As part of the armistice that halted the fighting between the two sides, Korea was divided along the 38th parallel, creating the two separate governments of North and South Korea. China's support for the DPRK during the war demolished South Korean-Chinese relations, and the two countries had essentially no contact for several years. Instead, South Korea focused on its relationship with the U.S.

The Korean War left South Korea in ruins, and the American government poured money and resources into the country in order to solidify Korea's identity as a capitalist nation. Foreign aid played a significant role in the country's swift economic recovery and growth; in the 1950s, foreign aid financed 70% of Korea's imports. The U.S. and South Korean governments now had strong diplomatic ties to one another, mainly through foreign aid and economic investment.

Relations between South Korea and China remained nonexistent until the eighties. Although President Park Chung-hee tried to establish a policy of communication between South Korea and China in 1961, official contact did not restart until 1983, when six Chinese nationals hijacked a Chinese domestic passenger plane. China reached out to Korea in order to coordinate an emergency landing in Chuncheon, South Korea. From there, things continued to improve as formal diplomatic relations were established in August 1992. In 2007, the U.S. and Korea signed the Korea-United States Free Trade Agreement, and in response, China began pursuing a free trade agreement with Korea as well. In 2015, the China-Republic of Korea Free Trade Agreement was finalized. The agreement aimed to raise annual bilateral trade between the two countries to \$300 billion dollars. Things seemed to be warming up between the two countries.

Then, THAAD happened.

In 2017, the Korean government allowed the U.S. to place its Terminal-High Altitude Area Defense (THAAD) system in South Korea as a reply to increasing provocation from North Korea regarding nuclear and missile capability. China interpreted THAAD as a threat to its security, since the system uses radar that could look into Chinese territory. As retaliation against THAAD, China launched a massive informal boycott of Korean products. Citizens were encouraged through official media to stop buying Korean goods, stop traveling to Korea, and stop supporting Korean celebrities. Hyundai and Lotte – massive Korean conglomerates – were specifically targeted. All in all, the boycott cost Korea an estimated \$7.5 billion dollars in economic losses. Through diplomatic détente in 2016 and 2017, the two countries were able to mend their economic relationship, and in 2018, China was still Korea's largest trading partner by far, making up 26% of South Korea's total exports. That being said, the fallout over THAAD confirmed what many already knew: Korea's role as an intermediary and its economic dependency

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on two massively powerful, diametrically opposed countries puts it in dangerous territory.

Now, in 2023, Korea's balancing act continues. Hyundai and Kia, leading South Korean car companies, made up 9.2% of South Korea's total GDP in 2018. They are considered two strong pillars of the Korean economy, and they get most of their EV batteries from CATL, a Chinese battery manufacturer. Since the IRA was passed, Hyundai has responded by signing an agreement to source electric vehicle (EV) batteries in North America, dropping their China-manufactured CATL batteries. Additionally, South Korean firms are expected to invest a total of \$13 billion in the U.S. by 2025 to support EV battery production. Though the Korean market has made its choice, the Korean government is not happy about the situation. Multiple Korean officials traveled to the U.S. in order to discuss the situation with members of the American Congress, a senior official called the IRA "a betrayal", and the Korean government sent a letter to the U.S. voicing its concerns. One particularly incendiary statement came from Korea's Industry Minister Lee Chang-yang, who implied that Korea has grounds for pursuing legal action against the U.S. for violating the World Trade Agreement and the KORUS FTA. But from the perspective of the U.S., these complaints hold very little weight. Though the U.S. has tried to appease Korea (Kamala Harris traveled to Seoul in September last year to meet with Yoon Suk Yeol to

discuss the issue), the results have been immaterial: the two pledged to "continue to consult" on the matter. Hyundai and other firms have already chosen to align themselves with the U.S., so there is no incentive to roll back any of the IRA's protectionist measures. The only concrete method of retaliation that Korea has available is to ally itself more closely with China in response to U.S. economic provocation, which could lead to its own set of issues due to China's support for the DPRK.

In recent years, some experts have suggested that Korea should seek out a third option: fostering closer ties with other middle powers to increase its overall autonomy and mitigate the pressures of being a lynchpin for two superpowers. Dr. Hyeung-Kyu Kim, professor of political science at Ajou University, suggests that Korea should seek greater cooperation with countries such as Australia, Vietnam, Germany, and Indonesia in order to "enhance a rules-based international order" and reduce the burden of U.S.-China strategic rivalry. This could be a helpful strategy, especially since we do not yet know how China will respond to Hyundai's decision to forego CATL batteries and effectively abandon the Chinese market in favor of pursuing American buyers. Regardless, the fallout over the IRA is yet another instance that demonstrates South Korea's precarious position of being stuck between a rock and a hard place.

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## Elections, Earthquakes, and Erdoğanomics: The Political Economy of Erdoğan's War on Inflation

Written By Esmā Ozgun

As Turkey suffers from the destruction of the deadliest earthquake in decades, President Recep Tayyip Erdoğan will have to contend with the exacerbation of preceding economic challenges. Prior to the quakes, the nation was grappling with a volatile, devalued currency and an inflation rate of a staggering 80% last October, fuelled by the relentless lowering of interest rates. Added to the equation is an estimated loss of \$84 billion (around 10% of Turkey's GDP) and a devastated population. Amidst all the chaos, Erdoğan is making a bid for the upcoming elections in May.

At the epicenter of Turkey's economic woes is institutional corrosion and democratic backsliding, which has enabled Erdoğan to brazenly slash interest rates despite raging inflation. Beginning with the violent crackdown in 2013 on the Gezi Park protests, Erdoğan has emerged as a political strongman, consolidating greater power via a constitutional amendment that shifted the parliamentary system to a presidential one. He controls the nation's monetary policy through his reign over the central bank, which has succumbed to political pressure despite remaining nominally independent. Over the last two years alone, three governors were forced to resign after refusing to comply with the President's unusual demands.

All of this has enabled Erdoğan to implement what is dubbed "Erdoğanomics," the President's heterodox alternative to neo-classical economics, which maintains that higher interest rates actually increase inflation and not vice versa. Erdoğan has consistently lowered rates in response to raging inflation, persisting with a recent reduction by 50 basis points despite the earthquakes. In addition to bewildering economists, Erdoğanomics also presents a confounding puzzle for political scientists — as presidential elections draw nearer, why does the President

persist in lowering rates despite the political repercussions? Indeed, a study conducted in Turkey last year concluded that inflation and currency crises reduce voter preference for the incumbent by 7 percent, while a currency devaluation of 6.6% lowers approval ratings by 1.6%.

Most media in the West dismiss Erdoğan as lacking rationality or being deluded by religious zeal, given that usury is prohibited in Islam (the primary religious affiliation in Turkey) and is condemned by Erdoğan as "the mother of all evil." However, ignoring other possible motives prevents insights into Turkey's economic affairs and investigations as to why developing nations sometimes pursue seemingly self-destructive policies.

One theory is that Erdoğan wishes to pursue a manufacturing-based, export-led economy modeled on Asia, as he has cited the example of China's growth trajectory on several occasions. Currency undervaluation, when done carefully, can abet growth among developing nations by boosting the international competitiveness of domestic firms due to the cheapening of exports vis-à-vis other countries. Depreciation also reduces labor costs, which attracts greater international investments and thus increases growth. Is the depreciation of the lira, which is a consequence of low interest, part of a long-term plan to cultivate a production hub? Does President Erdoğan perceive the economic and electoral costs of his policies as a short-term necessity?

Publicly he may be marketing it as such, but Erdoğan is conversely making maneuvers to keep the lira afloat. In 2021, he announced a "lira-ization" scheme, ensuring investors against currency losses in Turkish Lira deposits, thus depressing demand for the dollar. He has burned through hundreds of billions of dollar reserves to slow domestic depreciation, and subsequently has resorted to political acrobatics to attract dollar

deposits from abroad. Vitriolic condemnations of “enemies” and “terrorists” were reversed as ties were normalized with Israel, the UAE, and Saudi Arabia, the latter of which deposited 5 billion dollars after the murder of journalist Jamal Khashoggi was swept under the carpet.

Incidentally, the liraization policy reveals how Erdoğan isn’t as pious as the West may claim. By guaranteeing returns on lira investments and exempting the gains from taxes, Erdoğan has generously incentivized individuals to profit off of interest — thus tempting those that may have otherwise stored dollars under their mattresses. In essence, he has indirectly raised the interest rate indexed to the dollar, signifying deeper dynamics at play than simply the hollow religious justifications offered to the public.

The abundant currency interventions also disprove the desire to create an export-led model, revealing it as an excuse for the inability to curb depreciation. As Eray Şimşek at the Central European University argues, currency depreciation is viewed not as an opportunity, but as an undesired consequence of low-interest rates. Aside from religion, then, why are interest rates off the table? A possible explanation is the relationship between business and the state, the former of which has vested interests in Erdoğan’s monetary policy. The cultivation of business loyalty — specifically, the construction sector — aided the political ascent and consolidation of the Justice and Development Party (AKP). Construction firms bolster the AKP’s legitimacy by creating short-term growth and issuing cheap housing for their voter base, and in return benefit from low interest rates that provide them with cheap credit. This has in turn bred the dependency of the urban poor on the AKP, creating a resilient electoral coalition.

Erdoğan may have a reason to believe that low-interest rates will generate sustained growth. The initial boom of the construction sector stimulated various other economic sectors, created job opportunities, and facilitated the expansion of a thriving middle class, all of which contributed to the electoral success of the AKP since 2003. Within a wider context, Erdoğan’s pursuit of growth at the expense of macroeconomic consequences is not an isolated motivation, but a part of the wider debate between the “developmentalists” and “stabilizers” in Turkey’s bureaucratic circles. While stabilizers argue for financial stability and predictable inflation, developmentalists favor vigorous stimulation for growth. It isn’t surprising that construction companies are the outspoken voices of the developmentalists. The quid-pro-quo between these firms and the AKP extends beyond a transaction of interest rates and voter support into a larger issue of state capture, where the sectoral interests of firms bleed into public policy. Positions on both sides are occupied by the same individuals, paving the way for corruption; among the ten companies that receive the most public tenders globally, Turkish construction companies constitute half of the list. The “Big Five,” as they are known, are offered capital procured from groups disloyal to the AKP and favored in the privatization of government-owned enterprises, in addition to siphoning public rent. As such, these firms are often ardent supporters of Erdoğanomics, offering another plausible rationale for Erdoğan’s insistence on low interest.

Construction and real estate may have yielded desired economic growth at the time. However, as the economist Daron Acemoglu argues, robust institutions that are necessary for

sustained innovation and development are lacking in Turkey, along with productivity growth which has been zero or less over the past decade. The political system, civil society, and educational institutions must be able to operate freely to attract investment and quality growth. Erdoğan’s increasingly autocratic rule, however, makes this unlikely.

Yet the President’s grasp on power is unstable. The scale of the present devastation partly lies in the aforementioned corruption; lucrative deals with construction firms led to the government’s negligence in enforcing building codes and diverted the focus from repairing low-grade apartments. As always, the lower classes have borne the brunt of these blunders, previously having shouldered the impact of Erdoğanomics. The middle class that Erdoğan had once helped cultivate is eroding, as food and transportation prices have doubled and youth unemployment has reached 25 percent; added to the distress, a population of 1.5 million people is now homeless following the earthquakes. All of this is an enormous blow to Erdoğan’s political prospects, who has resorted to doling out tax cuts, early retirement pensions, and energy subsidies ahead of the election.

If anything, the effects of the earthquakes exemplify the fundamental issues underlying Erdoğanomics. President Erdoğan’s reach has extended to relief agencies, where he has staffed positions with loyal executives and downgraded the Turkish Red Crescent Society in favor of the government-operated Disaster and Emergency Management Presidency (AFAD), over which he can exercise greater control. Both were ultimately unsuccessful in coordinating aid to victims, attesting to the institutional decay underlying flawed construction practices — in the exact same way it underlies Erdoğanomics. With the construction sector now under fire, it remains to be seen if present economic conditions will trigger the demise of Erdoğan. The people are disenchanted with his policies as it becomes clear that rather than waging a holy war against interest, he is lining the pockets of fellow loyalists. Indeed, the economic trajectory of Turkey has less to do with irrational, uninformed economic policy and more to do with power poisoning — offering us all a potent lesson on the significance of sound institutions and politics for ensuring economic stability.



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# Beyond Rational Expectations: Alternative Behavioral Approaches to Economics

Written By Evan Davis

My best friend's breathing was picking up as the sun set on the horizon. Our mountain biking trip was quickly about to become a ride through the darkness.

I grabbed his shoulder. "Myles, calm down. Let's be rational."

He violently twisted, throwing my arm off, kickstarted his bike, and sped on down the road, panic twisting his face. He later told me he was overcome with raw terror at the thought of the impending darkness.

"He could die," I thought to myself. The mountain road, while paved, was a series of twists and turns with cliffs on either side and potholes abound. If he went off the side, it would be a quick and fatal plummet.

This is an extreme example of emotion overtaking one's rational judgment. But it happens to all of us, all the time. Psychology permeates our everyday lives, affecting the way we make our decisions.

When you combine psychology and economics, you get an approach known as behavioral economics. Economies are made up of people taking action, and psychology is the study of how people act – it seems intuitive that the two fields should complement each other. Yet, for the longest time, and even now, orthodox economics typically leaves psychological analysis out of its models.

Rational expectations theory, rational preferences, and rational choice theory are assumptions made in most mainstream economic models. Rational choice theory essentially posits that individuals act as optimizing agents, rationally and coherently analyzing all given choices with their costs and benefits to determine the best course of action. Rational preferences are "well-behaved" preferences, which are both transitive (A being preferred to B and B being preferred to C means A is preferred to C) and complete (preferences encompass all possible choices the agent must make). Rational expectations theory extends rationality theory to the macroeconomic level. It acknowledges that while people make mistakes, their predictions about the economy are based on rational analysis of knowledge about how the economy actually works, and as such, people's predictions about the economy are usually correct on aggregate.

Behavioral economics' primary contribution to economic theory has been to challenge the mainstream assumption of rationality. As University of Chicago's economics department states, mainstream neoclassical-Keynesian economics assumes that "most people have well-defined preferences and make well-informed, self-interested decisions based on those preferences." In other words, people are rational. Yet, substantial empirical evidence exists showing that people can be "irrational." New theories of rationality, such as bounded rationality (the idea that individuals will simply make choices they find satisfactory, rather than optimal choices), have popped up, challenging

the orthodox view.

This is not to say that the mainstream is unaware of behavioral economics and irrationality. For starters, behavioral and experimental economists such as Daniel Kahneman, Richard Thaler, and Vernon Smith have won the Nobel Prize for their work. Mainstream models have also started integrating behavioral findings into their assumptions, such as time inconsistency (which you learn about if you take math-intensive microeconomics under Professor Stefano DellaVigna, a behavioral economist here at Berkeley). Work has been done defending mainstream economic conclusions without relying on its rationality assumptions. For instance, a simulation done by economists at Carnegie Mellon showed that auction-like markets can bring about efficient static resource allocation, even when the participants are very irrational ("zero intelligence traders" who act randomly are much more irrational than people are in reality).

Since the mainstream recognized the validity of numerous behavioral propositions, a lot of work has been done synthesizing behavioral and neoclassical economics, as well as behavioral and orthodox Keynesian macroeconomics. The field has become so well-respected that some have argued that behavioral economics is the new mainstream approach to rationality.

## Behavioral Heterodox Economics:

Despite behavioral economics being more accepted in mainstream economics, the orthodoxy still generally adheres to theories of rationality. However, behavioral economics has succeeded in exerting a substantial amount of influence over alternative, heterodox approaches to economics as well – notably the Austrian and heterodox Keynesian, or Post-Keynesian, schools of economic thought. Both the Austrian and Post-Keynesian schools of thought focus on the subjective experiences of people in an economy. Both recognize that people's knowledge and expectations are shaped through the passing of time, and that they follow "rules of thumb" via bounded rationality in a world of unquantifiable uncertainty. The primary benefit of markets, in their eyes, is less so efficient static allocation of resources, and more so the dynamic progress provided by creative, entrepreneurial action. Hence, both approaches recognize that people are not the perfectly rational, knowledgeable beings generally assumed in neoclassical or mainstream Keynesian economics. Neither approach is inherently opposed to behavioral analysis.

Despite behavioral economics often centering around people's irrationality, it doesn't necessarily promote government intervention in the economy. Austrian economists are known for being especially supportive of laissez-faire capitalism. Yet, unlike their mainstream free-market counterparts, Austrian economists do not assume transitive preferences or completely rational decision-making in their models. Some Austrians, such as economist Ludwig von Mises, conceive of all action as inherently "rational" in the sense that it's aimed at some sort of conscious or subconscious desire over the person. Mises notes

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that calling action irrational requires imposing an external value judgment upon the action. However, this form of rationality is tautological, and is consistent with the observed 'irrationality' of behavioral economics, in contrast to the theoretical rationality of neoclassical economics.

Economist Gustavo Cevolani argues that Austrian and behavioral (particularly experiment-based) economics share common themes of subjectivism and methodological individualism (focusing on the actions of individual people), and thus can enrich one another. Indeed, many economists have utilized behavioral economics to empirically support certain Austrian theories with psychological components. Austrian economists Powell and Oprea argue that the results of laboratory psychological experiments testing Austrian hypotheses can be generalizable to an economy, while 2002 Nobel Laureate Vernon Smith argues that behavioral experiments lend observational credence to the Austrian proposition that prices convey decentralized information about the economy to individuals, and result in efficient gains from trade. In their book *The Economics of Time and Ignorance*, Austrian economists Rizzo and O'Driscoll argue that the findings of behavioral economics strengthen the Austrian approach.

Behavioral economics also shares common themes with the economics of Keynes. Keynes argues in his treatise *The General Theory of Employment, Interest, and Money* that investors in an economy are driven by irrational psychological urges to invest, which he coined 'animal spirits.' Although modern Keynesian economists often adhere to rational expectations theory, the more heterodox Post-Keynesians certainly do not. Post-Keynesian economist Marc Lavoie argues that while behavioral economics is too friendly to orthodox views of what counts as "rational behavior" (a view he somewhat shares with the Austrians), it nonetheless demonstrates bounded rationality, which he identifies as one of the core bases of Post-Keynesian microeconomics. In the realm of Post-Keynesian macroeconomics, economist Hyman Minsky developed a highly psychology-based theory of the business cycle known as the Financial Instability Hypothesis. The theory posits that in times

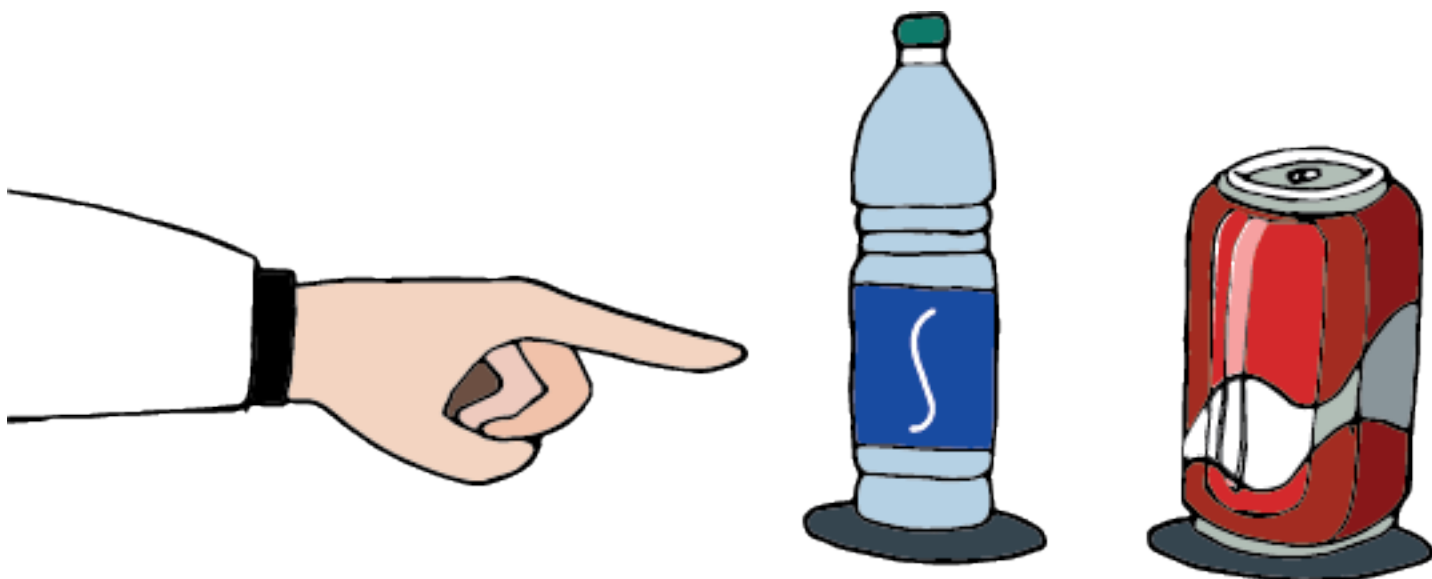
of propensity, economic confidence (similar to Keynesian 'animal spirits') prompts investors to make risky investments which they can't pay off in the end. Their failure to pay off their debt results in a crash. Some of the theory's psychological components have even been critically accepted by certain Austrian economists. And while economists Therese Jefferson and J.E. King argue that while Post-Keynesian and behavioral economics have not had much explicit interaction to date, there is plenty of room for the two schools to enrich each other. Economist Matthew Fung points out in a response to Jefferson and King that behavioral economics has contributed quite a bit to Post-Keynesian microeconomic theory; for instance, it found out that all other things being equal, groups of people will behave more risky than individuals, which helped develop the Post-Keynesian theory of the firm.

Behavioral economics has also supplemented further alternative/applied fields of economics. Behavioral approaches to environmental economics have allowed environmental policymakers to work outside the bounds of rational choice and rational expectations theory, applying psychological findings and nudge theory to environmental policy. Work even exists applying behavioral economic analysis to Marxian economics. For example, economists Jeffrey Carpenter and Peter Matthews connect the irrational behavior of individuals to their economic class (capitalist or worker).

#### Paternalism vs Markets:

Behavioral economics has shown that people aren't always 'rational.' Now, what?

Many behavioral economists believe that irrational behavior is simply a vice which policy can overcome. These paternalistic behavioral economists advocate something known as 'nudge policy.' In essence, nudge policy involves psychological 'nudges' people towards making "better" and "more rational" choices. For example, placing water closer to the cash register in a store than soda psychologically 'nudges' people to choose water over soda, simply by making the water more prominent and





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easier to access than the soda. This sort of policy works well. Nudge policy has succeeded in increasing the number of registered organ donors by making organ donation an opt-out rather than opt-in. Simple reminder messages increased the number of people signing up for doctor's appointments or filing for student aid. Providing people with information regarding their and their neighbors' energy usage reduced energy usage. Case in point, examples are numerous. Nudge policy provides a way for policymakers to respect freedom of choice while promoting socially optimal outcomes; by simply encouraging better choices rather than outright banning bad ones.

However, not all economists agree that nudge policy is optimal. First off, the precedent it sets is dangerous when taken to its logical conclusion. If people can be irrational in a market context, what makes them any more rational when it comes to voting? This is empirically substantiated. Yet, if we were to adopt 'nudge' policies when it came to voting, this could very quickly become extremely anti-democratic and very easy for the state to abuse towards its own ends.

Secondly, as economist Mario Rizzo notes, there is a potential knowledge problem with paternalistic nudge policy. In essence, nudge policy is meant to optimize behavior by eliminating irrational action, namely action which fails to achieve the given individual's actual goal. However, paternalistic nudge policy assumes that the policymaker understands the individual's goal better than the individual themselves. What is "rational" vs "irrational" is subjectively defined by the institution (government or other group) pushing the nudge policy, instead of by the individual. However, the institu-

tion is made up of people, just as irrational as any consumer. The difference is, the consumer understands their own desires, and the choices they can make to best satisfy those desires, better than any planner does. The consumer can be wrong, yes, but the planner doesn't even know what the consumer wants or what their choices are. Wichita State University economist Abigail Devereaux compares nudge policy's knowledge problem with socialism's knowledge problem: that a socialist central planner is incapable of determining consumer desires without prices to signal consumer demand. The fallacy is fundamentally the same: the policymaker is assumed to have superior knowledge of consumer desires and available choices than the consumer themselves.

Regardless of whether or not behavioral economics is a valid justification for paternalistic government policy, it has succeeded in challenging the way we traditionally think about economics. Not only has it successfully influenced mainstream neoclassical and Keynesian economics, but it has opened the door to research validating alternative subjectivist approaches to economic theory. It has also contributed unique insights to applied forms of economics, allowing us to better understand what drives social and material phenomena such as climate change.

As for my friend Myles and I, we eventually made our way down the mountain to safety. But, the experience taught me that emotion can easily cloud one's judgment, and demonstrated how irrationality lies in wait around every corner.

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## Amtrak: Future of American Transit or Failed Expiement?

Written By Felix Zhang

Since its inception, Amtrak has long been the source of great debate and controversy. Proponents point towards Amtrak's ability to connect the United States through a network of long-distance and state-operated routes, which have a myriad of economic and environmental benefits compared to other types of transit. Meanwhile, Amtrak's opponents emphasize the fact that Amtrak has never been profitable in its fifty year history. Is Amtrak just a money wasting vestige of a bygone era that should be abolished? Or does it present a viable and important form of transportation for the future of the country?

### Why Does Amtrak Exist?:

Amtrak was established under The Congressional Rail Passenger Service Act of 1970 as a way to combine twenty struggling private passenger railroads into a privately controlled but government owned corporation. While over 90% of inter-city travel in the earlier part of the 20th century took place on the nation's rails, prevailing trends and new technological developments rendered America's railroads less practical for passengers. Instead of trains being the dominant mode of inter-city travel, many Americans started to shift towards using cars to get around. This was largely prompted by the federal government's massive funding for the interstate system and support for the automotive industry. Furthermore, a burgeoning airline industry meant that long distances could be reached in shorter times, and often at cheaper prices.

Existing private rail companies such as Penn Central began

facing huge deficits in passenger rail, which hurt their profits and took a toll on their more economically viable freight operations. Therefore, the federal government stepped in to consolidate rail operations into one company under Amtrak, with the goal of preserving the most profitable or politically significant routes. Created under Nixon, Amtrak was doomed for failure from the start. On the surface, it was designed as a way to slim down the number of passenger rail routes in the country and take the financial burden off the shoulders of rail companies by shifting the weight onto the federal government. In reality, many railroad companies hoped for abolishment of passenger rail service in totality, believing that rails should only be used for freight travel. Due to the lobbying of freight rail CEOs, Amtrak was not given enough subsidies to even get off the ground. Many, including Nixon and his conservative colleagues, expected that the company would fold within a few years of its initial creation, which would spell the death of passenger rail in the U.S. and allow freight to control America's extensive rail network.

Furthermore, many of Amtrak's inherited trains were old, dirty, and in need of heavy maintenance. The infrastructure that was transferred to Amtrak's management was also aging rapidly and required repairs. However, perhaps the biggest issue of all was that under the Rail Passenger Service Act, Amtrak did not gain ownership of the majority of the railroad tracks that their trains ran on. To this day, 97% of Amtrak's route miles are owned by other companies, which means that these rails are not maintained with passenger comfort, safety, or speed in mind. In addition, the immense lobbying power of freight rail companies mean that laws cannot be passed or

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enforced to allow passenger trains to have right of way on freight owned tracks. Freight rail companies justifiably prioritize the timely arrival of their own trains despite existing laws requiring passengers to come first, which often comes at the expense of Amtrak's schedule.

On Amtrak's most popular Northeast Regional route that runs between Boston and Washington D.C. with stops in New York and Philadelphia, a rare instance where it owns most of the tracks, trains arrive on schedule 77% of the time. It is no surprise then that the Northeast Corridor accounted for 36% of Amtrak's total passengers and 52% of its gross ticket revenues in 2020. In fact, the Northeast Regional is one of the few profitable routes for Amtrak, and if Amtrak were run with profit as its first priority, it would certainly focus almost all of its operations in this area. Meanwhile, for most of its long distance routes that involve travel on freight-owned rails, on-time performance is under 60%. On Amtrak's worst routes, the Capitol Limited and Sunset Limited, trains reach their destination on time a measly 28% of the time. These are the lines where operation costs significantly outweigh ticket revenue for Amtrak, hindering its profitability. Were Amtrak only considering its bottom line, it would likely choose to abolish these routes, but politicians from both sides of the aisle as well as commuters on these train lines find it important to preserve these services as they are often a major part of connecting more rural regions to larger cities.

Throughout Amtrak's history, the company has never turned a profitable year, but seemed to be demonstrating greater economic viability before the COVID-19 pandemic. Amtrak lost only \$29 million on operations in the 2019 fiscal year, and was on track to become profitable for the first time in its history in 2020. Now, post-pandemic, Amtrak expects to continue losing up to \$1 billion per year for the foreseeable future as ridership numbers continue to recover and operating expenses trend upwards.

While part of Amtrak's operations are funded by its route revenues, a considerable part of their budget deficit is compensated through subsidies from state and federal government. Since its creation, Amtrak has received subsidies amounting to over \$45 billion dollars, a number that is expected to increase into the future.

### **An American Problem:**

Why has Amtrak never been profitable? Is there something systematically holding back rail development in the U.S. compared to other parts of the world? Besides the lack of Amtrak's rail ownership, which is arguably the biggest factor preventing growth, another reason is the size of the country. From coast to coast, the United States spans well over 2,000 miles at nearly all points, and this simply makes train travel — even running at top speeds — unfeasible compared to the sheer efficiency of flying over such distances. In addition, trains are often caught in the middle ground of political gamesmanship. Politicians who are strongly connected to the oil or car manufacturing lobbies often vocally oppose spending money on Amtrak and improving train infrastructure. This introduces the idea of induced demand - if we build more highways and make cars cheaper through subsidies this will encourage more people to drive. This same postulate has the potential to hold true for rail travel. Creating more routes, establishing cheaper tickets

through subsidies and economies of scale, and improving overall supply has the potential to drive up demand for rail travel over time.

However, not everything is so doom and gloom. Even though Amtrak itself might not be making money, those who want to suspend or reduce Amtrak's operations often fail to recognize that the company's routes generate between \$7 and \$8 billion dollars annually in economic activity, over four times the government's investment in the company. And even though Amtrak's long distance operations might appear to be bleeding money, many argue that they are in fact an important artery for the stations they serve, connecting small towns to major cities and driving economic growth between different destinations. Furthermore, according to the USDOT, an investment of \$1 billion in public transportation creates roughly 36,000 jobs, which could be crucial blue-collar roles in an increasingly automated economy.

While debate about the merits of expanding or contracting train services rage on in the United States, in many other parts of the world, train travel is an integral part of transportation. Part of this has to do with the greater political appeal of train travel in places like Europe. In countries like France and Austria, short-haul flights under two or three hours have been eliminated for government-subsidized airlines, with lawmakers instead promoting rail travel between close-distance cities. The decision is not just popular amongst political elites: a survey found that 62% of Europeans support a ban on short-haul flights.

Whereas trains in the United States often seem outdated, train travel in Europe has also taken on significant innovations in order to become competitive with other modes of transportation, such as the low cost airline industry. In addition to having faster trains that are easily capable of running at speeds in excess of 200 miles per hour, train companies have introduced a variety of services to target different types of customers. In France, SNCF's Ouigo service connects major metropolitan regions at prices comparable to or below that of low cost airlines, using more barebones high speed trains that charge extra for items like baggage, food, and beverage.

Despite their general success, trains across the world are not perfect. The UK's privatization of trains in the 1990s has led to a large spike in ticket prices and a poll found that 58% of Britons believed that rail privatization was a partial or complete failure. And trains now have to compete with the low cost airline industry which has blossomed in the past decade. But even in the UK, train ridership has increased drastically with new, faster services being introduced across the country.

### **Not Just Amtrak:**

While there are reasons to doubt the viability of trains in the United States both from a geographical and political standpoint, there is a market that Amtrak can, and must, take advantage of to increase ridership numbers and boost revenues. Rail works best in distances between 100-300 miles, running faster than cars dealing with traffic, and beating the time it takes to get to and from the airport and go through security. While cities in the U.S. are not as compact in distance compared to cities in Japan or France, there are several potentially profitable city pairs currently unserved by Amtrak where expansion could make sense. A rail corridor from Los Angeles

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As Amtrak mulls over its next move, passenger rail in the United States is no longer an operation exclusive to Amtrak. Founded in 2018, Brightline is the first major private passenger rail company established in the U.S. since the creation of Amtrak over five decades ago. Brightline currently connects the cities of southeast Florida, including Miami, Fort Lauderdale, and West Palm Beach. They have also neared completion of new track construction which would connect the train from Miami all the way to Orlando, with trains on the new section running at 125 mph — a far cry, in terms of speed, from its international counterparts but a major improvement compared to other services in the U.S. and a significantly higher speed than motor vehicles. Furthermore, Brightline has proposed the construction of the aforementioned Los Angeles to Las Vegas route, and if their Florida operations prove successful, they would likely target this expansion next. Brightline still needs to demonstrate that it can be a profitable business while competing in the car-centric and airline congested Florida travel market, but it has gained popularity, with ridership in excess of 150% of pre-pandemic levels while most transit organizations across the country struggle to reach 80% of previous riders.

In California, the controversial high speed rail project would connect the cultural and economic powerhouses of San Francisco and Los Angeles, traveling at over 200 miles per hour while stopping along several smaller cities in the state's Central Valley. Due to project delays and budgetary overruns, the cost of the project has ballooned to an exorbitant \$105 billion: a number that could continue to increase into the future. As much as this spending might seem completely overwhelming and unnecessary — there has certainly been mismanagement and needless costs in this project — the benefits of constructing California high speed rail will likely outweigh the astronomical costs. Just the first section running from Bakersfield to Merced is estimated to create 200,000 new jobs, not to mention over 10,000 jobs that have already been generated through the planning and construction of the route. The hope is that California High Speed Rail will incentivize further similar projects through gained experience and proof of success: something Amtrak should have a vested interest in. All of this is without mentioning the biggest benefit of train travel. Just the first Bakersfield to Merced segment is expected to reduce

vehicle miles traveled by 284 million miles, which will clear up car congestion and most importantly create significant reductions in the amount of greenhouse gas emissions from transportation. The positive impact of California high speed rail for the environment by reducing car and plane travel cannot be understated, and perhaps will be the most unheralded but important economic impact of the project.

While these projects offer new opportunities for American train travel, many have also called for Amtrak to be simply privatized, a process that has met mixed results worldwide. While the UK's privatization has led to controversy and a worse customer experience, Japan's JR rail system was privatized in 1987 into six regional companies that are focused on generating profits. Privatization has enabled JR to leverage their real estate assets and focus on their highly profitable and efficient Shinkansen routes, while government subsidies ensure that they can still serve less high demand communities across the country.

It can also be argued that Amtrak already structurally operates as a private company — just one that won't shed its least profitable routes due to political factors. Unlike many other transportation authorities in the United States, Amtrak's goal is to eventually make money from passenger revenues and its leadership structure is similar to that of a corporation. Furthermore, the Congressional Research Project found no evidence that private railway companies would find success outside of the highly profitable Northeast Corridor. If companies like Brightline and projects like California High Speed Rail demonstrate their ability to make money and compete in the U.S. market, this can only be good news for Amtrak and the expansion of rail travel in the United States.

### **Investing in a New Age of American Rail:**

How does a company that has never managed to turn a profit in its history expand and grow its operations? Currently, Amtrak's most important asset is not its trains or rails, but its biggest proponent in the White House. President Joe Biden's public support for Amtrak is notable compared to his predecessors, and the \$1 trillion dollar infrastructure bill has \$66 billion set aside in funding for rail. A large part of this \$66 billion will go towards improving the Northeast Corridor, including repairing bridges and tunnels, some of which are over 100 years old. These infrastructure upgrades could improve ride times on the critical Northeast Corridor and reduce potential chokepoints, making Amtrak even more competitive compared to planes, buses, and cars.

Furthermore, Amtrak has released a plan to add service to 160 new communities through the addition of 39 new routes and enhancement of 25 routes by 2035. They believe that these network enhancements, which would cost roughly \$75 billion dollars to put into action, would result in an additional \$7 billion generated in economic activity per year, an investment that would have ripple effects in the rail industry and in the communities that Amtrak would serve. These additions would connect Amtrak to the 50 largest metropolitan areas in the contiguous United States and capitalize on the middle range routes where train travel has proved to be more viable compared to driving or flying. Of course, all of this relies on the support of politicians and freight rail companies, both of which have the power to prevent Amtrak from its ambitious expansion goals.

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But why should we support the expansion of a service that has long been losing money and doesn't show any signs of stopping this trend? Perhaps, the key to Amtrak's success is realizing that it does not have to be profitable, but instead serve as a tool to the public. Just as governments generally do not expect to break even on building highways or airports, they continue to construct these projects because of the economic activity that they generate, which improves the general welfare of the country's citizens. This brings up the question about Amtrak's purpose as a company. Instead of viewing Amtrak as a money-maker, what if we instead looked towards Amtrak's ability

to connect communities, and boost local economies through both business and leisure travel? What if we recognized the power of rail as a better driver for socioeconomic mobility compared to automobile travel, creating new opportunities for employment and education? What if we acknowledged the myriad of environmental benefits of Amtrak's train services, from lower carbon emissions to taking up fewer precious urban and natural spaces? The next time you hear about how unprofitable Amtrak is, take a moment to think about all the things that are not factored into the bottom line.



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# High School Essay Contest: Winner: The Woes and Wins of a Cashless Society

Written By **Natalie Wong**

A cashless society has been imminent for decades, but the COVID-19 pandemic (Romig & Young, 2022) and high interest rates across the globe (Labour, 2023) have accelerated society's transition toward a truly cashless financial system. Considering current trends and future predictions, the most pressing implications of a fully digital system lie primarily in the differences between transaction efficiency and traceability of cash versus digital payments.

On the microeconomic level, digital currency's efficiency advantage is a major benefit. Storing and transferring cash is much more expensive than storing or transferring digital payments. This advantage is highlighted by migrant workers, who regularly send cash payments that are subject to significant transfer fees back to their home countries. Digital remittances could cut their transactional costs to two percent because of the increased speed and ease of transfer, increasing remittance income to low-income households by \$16 billion USD annually (Adrian & Mancini-Griffoli, 2021).

On the macroeconomic level, the efficiency of digital cash also presents opportunities for governments to more effectively implement financial assistance policies and handle economic crises. Already, digital payment programs in Peru and Colombia have reached unbanked and economically disadvantaged individuals with unprecedented accuracy and speed (Agur et. al., 2020). Additionally, central bank digital currencies (CBDCs) would more easily allow governments to manage cash supply, regulate economic growth, and control inflation (Prasad, 2021).

However, efficiency is a double-edged sword. Those without proper infrastructure will quickly be outpaced, increasingly dividing the financial world. For example, India's abrupt demonetization in 2016 had a disproportionately negative impact on the poor (Agur et. al., 2020). This potential division goes for nations as well. Countries such as China, India, and Russia have embraced fintech at above 80%, while the US, France, and Japan lag behind with under-50% implementation (Peterson Institute for International Economics, 2022). In these ways, cashless societies can secure global economies – or increase technological and economic divides.

The traceability of digital payments also presents unique risks and rewards for cybersecurity. A cashless society necessitates innovation in cybersecurity, promoting advances in blockchain and other online security mechanisms. Yet as cybersecurity scales up, so does the sophistication and consequences of cybercrime. More than \$6 billion USD worth of Bitcoin has been stolen worldwide, and murky regulations mean that wronged users can only recover a small percentage of their losses (Harney & Stecklow, 2017). This consequence highlights a major shortcoming of cashless systems: without the proper legal oversight, online financial crimes succeed with little to no punishment, making members of cashless economies both uniquely secure from and uniquely vulnerable to cybercrime.

A cashless society can also decrease corruption on the small scale,

but enable corruption on the large scale. On the bright side, data tracking has led to lower rates of successful hacks in countries with centralized cashless systems (Jensen, 2019). However, institutions can also manipulate data to disadvantage certain communities. Many countries have been guilty of twisting financial data to enable discrimination in the past, such as the US's infamous 1930s redlining activities. Governments can continue these practices by using the massive amounts of digital financial data that a cashless society provides to more effectively target certain demographics. This situation is not simply a hypothetical as several countries, notably China, have already begun to experiment with policies that use digital cash tracking to lock undesirable citizens out of financial opportunities (Yang, 2022).

Finally, the absence of physical cash would have a nuanced effect on the environment. A single bitcoin costs the equivalent of 330,000 credit card transactions in carbon (Lindwall, 2022). CBDCs, however, take less energy to verify and use than modern credit cards (Lee & Park, 2023). So, a cashless society could tip either way on the environment. Advocates of digital finance would do well to consider exactly what type of 'cashless' society to support in order to make the environmental implications of digital cash a benefit rather than a drawback.

The variety of risks and rewards that a cashless system presents is overwhelming at first glance, inspiring caution in some and excitement in others. Working to understand both the good and bad sides of digital currency now will position the world in the most advantageous way possible, so that when cash becomes an artifact for the historians, digital finance will not be society's greatest weakness, but its greatest strength.

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# High School Essay Contest:

## Runner Up: No one Left Behind: Benefits and Drawbacks of a Cashless Society

Written By Peter Sklavo

Evan Peters is without any skill other than the melodies he is able to strum out on his old guitar. He heads to Washington Square Park to busk, but after two hours and either no eye contact or a simple plea of "sorry no change" all hope fractures in Evan as he realizes he probably won't eat tonight. Our world has been speeding towards a cashless society for some time now, with the pandemic only serving as an accelerant to that transition. A Pew survey found that since 2022, two-fifths of Americans use no cash. Cashlessness seems inevitable with so many benefits to the economy, such as crime reduction, reduced running costs, and better hygiene. However, it's the vulnerable and disadvantaged that are at most risk from a cashless society.

One of the main benefits of a cashless society is the impediment digital payments pose to organized crime. Corruption, money laundering, tax evasion, counterfeit money, bribery and financing

terrorism all rely heavily on the untraceable and portable nature of cash. Digital payments would make crime trackable and therefore a deterrent. A cashless society would also affect local crime as it would deter robberies or hold ups and disrupt low-level drug trafficking since digital payments would necessitate a record of transactions. Biometrics which analyzes individual physical characteristics, embedded microchips and artificial intelligence payment systems will all assist in the prevention of fraud and identity theft. Of all the benefits of a cashless economy, the impact on crime is the most compelling as it would profoundly improve our society.

Another benefit of a cashless society are lower transaction and management costs of money. Small retailers cite the risk of robberies as well associated costs as a motivation for eliminating cash. These include the cost of safes, cash register video surveillance, cash-accepting registers and trips to the bank to deposit cash making cashless business transactions a more appealing

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option. By eliminating cash, businesses increase operating efficiency and a safer work environment. For the individual, a cashless society makes the daily management of money much easier. Storing and protecting money, and bank visits to deposit and withdraw cash are eliminated. This process has also gained momentum through the closure of multiple physical bank branches which seems to be aligning with the move toward greater digital transactions.

Covid spurred the rush to cashlessness for two reasons: no contact and better hygiene. Paper currency and coins are not sanitary, easy to steal and costly to handle. Better hygiene is a genuine deterrent to the use of cash. Whilst it is unlikely that Covid could spread by bills, paper currency is unquestionably dirty. Researchers detected multiple microbes in their analysis of paper currency, including those found on genitalia and inside mouths as well as traces of cocaine.

One of the major drawbacks of a cashless economy is digital trackability. A digital trail exposes consumers to questions about privacy, identity and other information such as spending habits. Data from digital transactions would provide specific consumer information to those with access to that data, such as credit card companies, retailers and even hedge funds that buy data. According to Chris Hoofnagle, Law and Information Professor at the University of California at Berkeley, “The more they know they know about you, the more opportunities there are for manipulation.”

Another major drawback of a cashless economy is the effect it has on two of the most vulnerable groups in our society: the elderly and low-income earners. According to Federal Data, elderly Americans still use cash for one-quarter of their purchases, while low-income earners rely on cash for a third of their purchases. According to Jay Stanley, at the ACLU, “There’s still a significant chunk of Americans who are either unbanked or underbanked.”<sup>5</sup> The main reason for this is the cost associated with banking and credit card fees as well as greater control over spending. The transition to a cashless society will require a great deal of consideration if the vulnerable elements of society are not to be left behind.

Evan Peters heads into Washington Square Park and props up his QR code card with a sign “Tips are welcome”. A lady comes over in response to the strumming sounds of “Bridge over Troubled Waters” and scans the QR code with her smartphone. A thrilling beep signals the \$5 she is transferring as it makes its way through a downloaded app gateway and into Evan’s PayPal account. Evan smiles in gratitude and sheer relief that he will eat tonight.

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