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The Price Effects of Universal Basic Income:

Exploring the Alaska Case

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Abstract

Universal basic income (UBI) has become a controversial proposal for alleviating poverty and increasing economic security. While many studies evaluate the effects of UBI, almost no research evaluates its effects on prices. In order to assess how a UBI would truly impact its recipients' purchasing power, I evaluate the price effects of the Alaska Permanent Fund Dividend (APFD), a state-wide UBI funded by oil royalties. I fit a mixed-effects regression model to determine if the Consumer Price Index (CPI), an indicator of consumer prices, changed differently in the Anchorage metropolitan region from other metropolitan regions across the U.S. after the implementation of APFD. I find an Empirical Bayes Estimate of 0.10 for Anchorage, suggesting a moderate price increase due to the

APFD. While not fully offsetting the program's benefits, price increases likely counteract some of UBI recipients' gains in purchasing power.

Introduction

As economic anxiety and frustration with our political system rises, American citizens and experts are exploring bold new solutions to economic problems. One policy prescription that has gained significant attention is the universal basic income (UBI), a policy in which every adult in a given political unit are an equally valued direct cash transfer. The unexpected rise of entrepreneur Andrew Yang's political campaign, which was centered around implementing a universal basic income around the country, demonstrates that the UBI debate will be critical in social and economic policy.[1] The added attention to UBI also demonstrates the importance of evaluating the policy's effects.

Many randomized control trials (RCTs) in developing countries have found a plethora of socioeconomic benefits from cash transfers to low-income individuals. These benefits include increased consumption, reduced economic security, improved health and education, and even improved psychological well-being. However, by randomizing a relatively small number of individuals into treatment and control groups, these studies fail in analyzing how a universal basic income would impact an entire economy. Macroeconomic effects such as changes in consumption, unemployment, and prices affect the amount of purchasing power that a UBI provides. Therefore, investigating these macro effects is critical to understanding how a universal basic income would impact recipients in every way, from their economic security to their health and psychological well-being.

[1] Villa, L. (2019, November 5). Andrew Yang Has the 'Yang Gang' to Thank for His Primary Power. Retrieved from https://time.com/5718279/andrew-yang-primary-support/

One of the critical and underexplored macro effects of UBI is price effects. By increasing citizens' income, a universal basic income would likely increase demand for most goods and services, which would increase prices. Even the policy's biggest proponents, such as Andrew Yang, acknowledge that a UBI would induce inflation.[2] However, the degree of price inflation from a UBI is debated intensely, as opponents argue that such price effects would wipe away any of recipients' gains in purchasing power.[3]

Central to Yang and other UBI proponents' arguments is that the policy would create a multiplier effect, in which people would use their greater purchasing power to buy more things, which would create more jobs, and stimulate the economy.[4] While household-level consumption has been measured in many RCTs of cash transfers, the effects on consumption across an entire economy have not been investigated empirically. Consumption effects across an entire economy would not necessarily be the same, as they are impacted significantly by price and unemployment effects, which themselves cannot be estimated precisely from an RCT.

In order to test the macro effects of UBI, I use the Alaska Permanent Fund Dividend (APFD), a state-wide UBI funded by oil revenue. I ask whether the Alaska Permanent Fund affected the prices of goods and services within the state. I propose answering this question through the Consumer Price Index (CPI), which measures changes in the price level of a weighted average market basket of consumer goods and services purchased by

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[2] Yang, Andrew. The War on Normal People: The Truth About America's Disappearing Jobs and Why Universal Basic Income Is Our Future, p. 183

[3] Archetto, G. (2018, July 16). Implementation of a 'universal basic income' program would be a disaster. Retrieved from https://thehill.com/opinion/finance/397192-implementation-of-a-universal-basic-income-program-would-be-a-disaster

[4] Yang, Andrew. The War on Normal People: The Truth About America's Disappearing Jobs and Why Universal Basic Income Is Our Future, p. 98

households. I evaluate whether it changes differentially from other comparable metropolitan areas in the Anchorage metropolitan area after the implementation of the APFD through a mixed-effects model described in the methods section.

I hypothesize that the PFD likely increased prices, but not significantly. Theoretically, greater demand should increase prices, but the paper by Cunha et al. discussed in my literature review does not find significant price increases from a cash transfer.[5] Since programs that subsidize a specific item, such as SNAP or housing subsidies, significantly increase demand for such an item, their price increases should be more detectable than that of a UBI. However, because a UBI's price effects would impact all goods and services, it is unclear which policy would induce larger price effects.

Literature Review

Motivation for UBI: Costs of Targeting and Disconnected Individuals

Currently, most anti-poverty programs in the United States are means-tested: individuals must qualify based on their income or other personal characteristics, such as parental status or employment status.[6] Means-testing attempts to target the most needy or "deserving" individuals. However, since the requirements for the many anti-poverty programs that currently exist are "duplicative and cumbersome for both caseworkers and applicants," a lot of the money spent on such programs is spent on administrative costs rather than to those in need.[7]

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[5] Cunha, J. M. (2014). Testing paternalism: Cash versus in-kind transfers. *American Economic Journal: Applied Economics*, *6*(2), 195-230.

[6] Means-Tested Programs: Determining Financial Eligibility Is Cumbersome and Can Be Simplified. (2001, November). Government Accountability Office

[7] Means-Tested Programs: Determining Financial Eligibility Is Cumbersome and Can Be Simplified. (2001, November). Government Accountability Office

Moreover, many needy individuals fail to access such programs. In 1996, President Clinton signed the Personal Responsibility and Work Opportunity Reconciliation Act into law in order to "end welfare as we know it." As such, TANF became a main form of cash assistance to many low-income individuals and families, and it focused heavily on promoting work and reducing government "dependency" (Center on Budget and Policy Priorities, 2020). For example, the law instituted a 60-month limit on TANF benefits, and employment (or employment-related activities) became a condition of eligibility for most recipients. Specifically, under TANF, states are required to have 50% of their recipients to be working or in work-related programs. This requirement incentivizes states to use even shorter time limits and sanctions to remove non-working individuals from the program (Blank, 2007). Meanwhile, EITC requires participants to work, while SSI recipients must be low-income, have a medical disability that lasts at least twelve months, and be unable to engage in an activity that gains one a certain monthly income (Blank, 2007). Therefore, many vulnerable, low-income individuals cannot access cash welfare programs.

As a result, the number and share of low-income, single mothers who neither work nor receive welfare, whom scholars label "disconnected mothers," has soared since the introduction of TANF. While many other individuals neither work nor receive welfare, I focus on single mothers, because their predicament likely affects children significantly, and there is more research on the status of this population. Under researcher Rebecca Blank's more stringent definition of "disconnected women" as those with no welfare or work income reported in the previous year, the share of disconnected women grew from 10.0% to 19.6% of low-income (household income at 200% of the federal poverty line or

lower) single women from 1990 to 2004, a 69% increase.[8] Including individuals who received no more than $2,000 in earnings and no more than $1,000 in public assistance over the previous year, the share of disconnected women rose from 14.8% to 25.3% of low-income single mothers over this period, a 56% increase. By 2004, disconnected women numbered 1.35 million or 1.73 million individuals under each definition.[9] According to another study, the rapid increased continued until at least 2010.[10] . A 2008 study reported that disconnected women have 1.8 children on average.[11] Therefore, this problem affects between 3 to 4 million children.

Based on demographic data, disconnected mothers seem to be particularly vulnerable individuals. Disconnected mothers are a racially diverse group, as just over 40% of them are white, more than a quarter are African American and another quarter are Hispanic.[12] About a third live alone and a third live with cohabitating partners, while about half of all low-income single mothers live alone and a quarter live with cohabitating partners.[13] Their nuclear family's median income fell drastically from $2,203 to $535 from 2004 to 2008, while total median household income decreased from $20,415 to $18,049.[14] The group faced low access to public services they would likely qualify for, which may

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[8] Blank, R. M. (2007). Improving the safety net for single mothers who face serious barriers to work. *The Future of Children*, 183-197.
[9] Blank, R. M. (2007). Improving the safety net for single mothers who face serious barriers to work. *The Future of Children*, 183-197.
[10] Loprest, P., & Nichols, A. (2011). Dynamics of being disconnected from work and TANF. *Washington, DC: Urban Institute*
[11] Blank, R. M., & Kovak, B. (2008). *Helping disconnected single mothers* (Vol. 38). Washington, DC: Brookings
[12] Blank, R. M. (2007). Improving the safety net for single mothers who face serious barriers to work. *The Future of Children*, 183-197.
[13] Loprest, P., & Nichols, A. (2011). Dynamics of being disconnected from work and TANF. *Washington, DC: Urban Institute*
[14] Loprest, P., & Nichols, A. (2011). Dynamics of being disconnected from work and TANF. *Washington, DC: Urban Institute*

suggest barriers or stigmas towards accessing these services. Only about half of disconnected mothers receive SNAP and public health insurance, while about one fifth receive public housing or housing subsidies.[15]

Researchers have argued that several key barriers prevent disconnected women from working. According to Blank, researchers have uncovered six main barriers: (1) Lack of education and learning disabilities, (2) substance abuse issues, (3) mental and physical health problems, (4) dependents such as young children, unhealthy adult relatives, and large families, (5) domestic violence in their past or in a current relationship, and (6) the excess TANF caseloads of many large cities.[16] Each barrier is associated with significant decreased chances of employment, according to most research. Among a national sample of TANF recipients, having a physical or mental health condition was associated with a 20 percentage point lower probability of employment.[17] The likelihood of working 20 or more hours a week was 9% lower for those with a major depressive disorder, 20% lower for those with drug dependence, and 12% for those with less than a high school education, according to a study of TANF recipients in a Michigan county.[18] Disconnected women self-reported similar for not working as these proposed barriers, along with difficulties finding a job. 56.9% listed pregnancy or taking care of children/others, 21.6%

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[15] Loprest, P., & Nichols, A. (2011). Dynamics of being disconnected from work and TANF. *Washington, DC: Urban Institute*

[16] Blank, R. M. (2007). Improving the safety net for single mothers who face serious barriers to work. *The Future of Children*, 183-197.

[17] Bloom, D., Miller, C., & Azurdia, G. (2007). Results from the Personal Roads to Individual Development and Employment (PRIDE) Program in New York City. *Administration for Children and Families*.

[18] Bloom, D., Miller, C., & Azurdia, G. (2007). Results from the Personal Roads to Individual Development and Employment (PRIDE) Program in New York City. *Administration for Children and Families*.

said “unable to find work, or on layoff,” 16.1% said "Injury, disability, or health reason,” 4.1% said “Other,” and 1.3% said "Not interested in working.”[19]

Both the difficulty of the most vulnerable individuals in accessing means-tested social safety programs, as well as the variety of factors that cause their situation suggest the limits of reaching such individuals through programs that are means-tested or address a specific barrier, such as substance abuse issues. Therefore, the “disconnected” population offers an impetus for a program that targets all of the barriers and does not means-test. As a result, a universal basic income, in which everyone receives a guaranteed amount of money, is an intriguing policy option.

History of the UBI

The idea of a universal basic income was arguably invented by Thomas Paine at the time of the American Revolution.[20] The idea gained attention in the United States in the 1960s, as prominent voices across the political spectrum endorsed some form of a UBI, from Milton Friedman to Martin Luther King.[21] In 1968, 1200 economists signed a letter arguing for the US congress to implement a system of income guarantees and supplements.[22] The following year, President Nixon announced the Family Assistance Plan, which proposed a guaranteed stipend for every family of $500 per adult and $300

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[19] Loprest, P., & Nichols, A. (2011). Dynamics of being disconnected from work and TANF. *Washington, DC: Urban Institute.*

[20] Marangos, J. (n.d.). Two arguments for Basic Income: Thomas Paine (1737-1809) and Thomas Spence (1750-1814). Retrieved from https://www.academia.edu/2698139/Two_arguments_for_Basic_Income_Thomas_Paine_1737-1809_and_Thomas_Spence_1750-1814_.

[21] Frank, R. H. (2006, November 23). The Other Milton Friedman: A Conservative With a Social Welfare Program. *New York Times*. Retrieved from https://www.nytimes.com/2006/11/23/business/23scene.html *Where Do We Go From Here: Chaos or Community?*(New York: Harper & Row, 1967)

[22] Bregman, R. (n.d.). Nixon’s Basic Income Plan. *Jacobin Magazine*. Retrieved from https://www.jacobinmag.com/2016/05/richard-nixon-ubi-basic-income-welfare/

per child.[23] Ultimately, the bill was mired in controversy over its effects on work incentives and on receipt of traditional welfare programs, and it failed to pass Congress.[24]

After a period of relative decline, UBI has regained significant attention in the United States in recent decades. Prominent liberal and conservative figures have endorsed the idea in response to concerns about income inequality, as well as the cost and ineffectiveness of current welfare programs.[25] Several eminent technology entrepreneurs have endorsed a UBI on the basis of expected widespread decline and displacement of work from automation, such as Mark Zuckerberg, Chris Hughes, Richard Branson, and Elon Musk.[26] Hughes co-founded the Economic Security Project, which has been funding basic income projects across the United States, such as an experiment in Stockton, California in collaboration with the city's mayor.[27]

The policy has especially received a spotlight through the presidential candidacy of technology entrepreneur Andrew Yang. Yang has made a "Freedom Dividend" of $1000 a month for every American adult the centerpiece of his campaign. Yang's campaign

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[23] Passell, P., & Ross, L. (1973, January 14). Daniel Moynihan and President-elect Nixon: How charity didn't begin at home. *The New York Times Book Review*. Retrieved from https://archive.nytimes.com/www.nytimes.com/books/98/10/04/specials/moynihan-income.html.
Bregman, R. (n.d.). Nixon's Basic Income Plan. *Jacobin Magazine*. Retrieved from https://www.jacobinmag.com/2016/05/richard-nixon-ubi-basic-income-welfare/

[24] Passell, P., & Ross, L. Daniel Moynihan and President-elect Nixon: How charity didn't begin at home.

[25] Sheahen, A. (2016). *Basic income guarantee: your right to economic security*. Place of publication not identified: Palgrave Macmillan.
Vinik, D. (20 November 2013). Paul Ryan Should Get Behind This Plan To Give Everyone Free Money. *Business Insider.*

[26] Catherine Clifford, C. (2017, December 28). What billionaires and business titans say about cash handouts in 2017 (Hint: lots!). CNBC Make It. Retrieved from https://www.cnbc.com/2017/12/27/what-billionaires-say-about-universal-basic-income-in-2017.html.

[27] Samuel, S. (2019, October 8). A California city gave some residents $500 a month, no strings attached. Here's how they spent it. Vox. Retrieved from https://www.vox.com/future-perfect/2019/10/8/20902839/universal-basic-income-stockton-trial.

garnered a strong base of support, raising $15.1 million from individual donations by Democratic 2019, and placing as high as fourth in national polls.[28]

History of the Alaska Permanent Fund Dividend

In 1980, Alaska implemented the Alaska Permanent Fund Dividend (APFD), a guaranteed income stipend to every adult resident of Alaska funded by the state's oil revenues. Because of unexpected variance in oil revenues, the fund has varied in annual value from $331.29 in 1984 to $2,072 in 2015.[29] The size of the permanent fund has become a critical issue in Alaskan politics. Republican Mike Dunleavy was elected governor in 2018 on the promise of increasing the PFD to $6,700 and has been unable to do so without significant cuts to other programs.[30]

Research on the Effects of UBI

So far, researchers have primarily tested the effects of income transfers through randomized control trials (RCTs). These transfers often take the form of a conditional cash transfer (CCT), in which receipt of the transfer is conditional to adhering to a certain behavior that is usually related to health or education, or an unconditional cash transfer (UCT), in which receipt of the transfer is automatically guaranteed. One RCT of a one-time conditional cash grant in Uganda found that recipients saw a 41% higher income and were 65% more likely to practice skilled trade than the control group, with even more

[28] Martin, J. (2020, January 24). #YangSurge trends after latest Emerson poll ranks Andrew Yang 4th nationally among 2020 candidates. Retrieved from http://www.newsweek.com/yangsurge-trends-after-latest-emerson-poll-ranks-andrew-yang-4th-nationally-among-2020-candidates-1483803.
[29] Permanent Fund Dividend. Alaska Oil and Gas Association. (2019, November 11). Retrieved from https://www.aoga.org/facts-and-figures/permanent-fund-dividend.
[30] Sundlee, R. (2019, September 5). Alaska's universal basic income problem. Vox. Retrieved from https://www.vox.com/future-perfect/2019/9/5/20849020/alaska-permanent-fund-universal-basic-income.

significant benefits to women.[31] An unconditional cash transfer in Kenya generated significant increases in income, assets, and even psychological well-being.[32] These results have held up in many interventions across Latin America and Africa, as evinced by a meta-analysis of 46 CCTs and another one of 21 UCTs that found significant positive results on a wide array of outcomes, such as household consumption and investment.[33]

While research on cash transfers in developed countries is far scarcer, it also demonstrates promising results on many crucial socioeconomic outcomes. A recent CCT program in New York City found mixed results. Two years after implementation, participants enjoyed significant improvements in school attendance, standardized test scores, family preventive health care, and parents' full-time employment.[34] However, a second iteration of the program found fewer benefits in each of these areas, and only saw educational improvements to high school students.[35] A large, ongoing experiment in Finland found significantly higher self-reported trust in other people and in institutions, as well as and confidence in one's future, one's financial situation, and one's ability to influence societal matters than the control group.[36] There are currently at least eight UBI

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[31] Cash Transfers: Changing the Debate on Giving Cash to the Poor. (2018, November 15). Retrieved from https://www.poverty-action.org/impact/cash-transfers-changing-debate-giving-cash-poor

[32] Cash Transfers: Changing the Debate on Giving Cash to the Poor. (2018, November 15). Retrieved from https://www.poverty-action.org/impact/cash-transfers-changing-debate-giving-cash-poor

[33] Kabeer, N., & Waddington, H. (2015). Economic impacts of conditional cash transfer programmes: a systematic review and meta-analysis. *Journal of Development Effectiveness*, *7*(3), 290-303.
Pega, F., Liu, S. Y., Walter, S., Pabayo, R., Saith, R., & Lhachimi, S. K. (2017). Unconditional cash transfers for reducing poverty and vulnerabilities: effect on use of health services and health outcomes in low-and middle-income countries. *Cochrane Database of Systematic Reviews*, (11).

[34] Riccio, J. A., Dechausay, N., Greenberg, D. M., Miller, C., Rucks, Z., & Verma, N. (2010). Toward reduced poverty across generations: Early findings from New York City's conditional cash transfer program. *MDRC, March*.

[35] Riccio, J. A., Dechausay, N., Greenberg, D. M., Miller, C., Rucks, Z., & Verma, N. (2010). Toward reduced poverty across generations: Early findings from New York City's conditional cash transfer program. *MDRC, March*.

[36] Kangas, O., Jauhiainen, S., Simanainen, M., & Ylikännö, M. (2019). The basic income experiment 2017–2018 in Finland. Preliminary results.

experiments analogous to UCTs in varying stages of development across Europe and the United States.[37] So far, there is little evidence on how and why the effects of cash transfer differ by the context in which they are implemented.[38]

By giving the transfer to a limited and randomly selected group of individuals, randomized control trials cannot detect how a UBI would impact an entire economy. Therefore, far fewer studies have tested the macroeconomic effects of a universal basic income. Macroeconomic effects such as changes in consumption, unemployment, and prices affect how much purchasing power recipients ultimately receive from a UBI. Therefore, investigating these macro effects is critical to understanding how a universal basic income would impact recipients in every way, from their economic security to their health and psychological well-being.

Skoufias et al. (2008) find similar consumption increases from equivalently valued food and cash transfers, and a similar lack of labor supply effects. The Mexican government randomly gave members of 200 randomly assigned remote villages $20/month in cash or food transfers, or gave nothing as a control group. The researchers found a 15.7-18.3% increase in food consumption and 13.9-17.1% increase in total consumption from the cash transfer relative to control, neither of which are significantly different from the results of the food transfer. Neither transfer affects overall labor

[37] McFarland, K., & McFarland, K. (2017, October 19). Overview of Current Basic Income Related Experiments (October 2017). Retrieved from http://basicincome.org/news/2017/10/overview-of-current-basic-income-related-experiments-october-2017

[38] Hagen-Zanker, J., & Himmelstine, C. L. (2014). What is the state of evidence on the impacts of cash transfers on poverty, as compared to remittances?. *London: Overseas Development Institute*.

participation, but both induce recipient households to switch from agricultural to nonagricultural labor.[39]

Cunha et al. provide the only study that has empirically examined the price effects of cash transfers. Researchers studying Mexico's PAL program hypothesized that the cash transfer would increase food prices by increasing demand. Prices increased by 1.5% in "less developed" villages, where sellers held greater market power due to fewer sellers and less integration with the regional and global economy. However, in the "more developed" villages, prices decreased by 0.7% and the results were not statistically significant. Overall, prices increased by 0.2% from the cash transfer, which was not statistically significant. The researchers concluded that price effects did not significantly impact consumers' purchasing power.[40]

Jones and Marinescu study the employment effects of the Alaska Permanent Fund Dividend (APFD). Since there can be no "control group" for Alaska, they created a "synthetic control," which provides a weighted average of states who were similar in the outcomes they were measuring to Alaska before the APFD was implemented. They found that employment rate and labor force participation rate were not significantly different in Alaska from synthetic control states after introduction of the APFD. Meanwhile, the part-time employment rate was significantly greater in Alaska than the synthetic control for most of the post-treatment introduction period, and it grows over time.[41] The researchers

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[39] Skoufias, E., Unar, M., & González-Cossío, T. (2008). *The impacts of cash and in-kind transfers on consumption and labor supply: Experimental evidence from rural Mexico*. The World Bank.
[40] Cunha, J. M. (2014). Testing paternalism: Cash versus in-kind transfers. *American Economic Journal: Applied Economics*, *6*(2), 195-230.
[41] Jones, D., & Marinescu, I. (2018). *The labor market impacts of universal and permanent cash transfers: Evidence from the Alaska permanent fund* (No. w24312). National Bureau of Economic Research, p. 14-16.

suggest that unemployment did not change significantly because the "income effect," in which some recipients chose not to work or to work less due to greater earnings, was offset by increased consumption.

Very little research has examined the price effects of other social programs. Researchers find that for every dollar that Pell Grants are increased, college tuition increases by 55 cents. Federally subsidized student loans, which unlike Pell Grants, must be repaid, increase tuition by 70 cents for each additional dollar. As a result, colleges, rather than students gain most of the benefits of the subsidy through tuition increases.[42] As a result of this finding, economist Jeffrey Dorfman argues that the gains of universal child care would be fully offset by the costs of childcare increasing. He argues, ""When government provides payments for anything, the cost of that good or service always rises."[43]

Therefore, the very limited research on the subject suggests that a universal basic income would have significant macroeconomic effects, which may alter all of the effects that the program has.

I hope to add to the very limited set of research on the macro effects of universal basic income by evaluating the price effects of the Alaska Permanent Fund. The Mexico PAL study, the only research on the price effects of cash transfers, evaluates price effects on the scale of remote, Mexican villages. In contrast, my paper evaluates price effects on

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[42]Lucca, D. O., Nadauld, T., & Shen, K. (2015, July). Credit Supply and the Rise in College Tuition: Evidence ... Retrieved from https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr733.pdf)

[43] Dorfman, J. (2016, October 19). Child Care Won't Get Cheaper If The Government Pays. Retrieved from https://www.forbes.com/sites/jeffreydorfman/2016/10/19/child-care-wont-get-cheaper-if-the-government-pays/#79b409151139

the scale of a Alaska, a large economy in an industrialized nation with a GDP of $47,460,000,000 and almost 750,000 residents. Moreover, my paper evaluates general prices of goods and services, rather than focusing just on food prices. Therefore, it can more fully capture how price effects modify changes in purchasing power from a UBI.

Methodology

In order to understand the theory behind price effects from social safety net programs, I spoke with Bruce Meyer, a professor at the Harris School who focuses on poverty, inequality, and social safety net programs. I asked Dr. Meyer on the economic theory and empirical evidence od price effects from a UBI and other social safety net programs. I also asked about how his economic career affected his general views about such programs.

In order to estimate the effect of the Alaska Permanent Fund Dividend on prices, I use the Consumer Price Index (CPI). The CPI measures changes in the price level of a weighted average market basket of consumer goods and services purchased by households. As this "basket" attempts to mimic the goods and services that consumers usually purchase, the CPI is a useful proxy for how changes in prices impact consumers' purchasing power, which is ultimately what I am trying to measure. Moreover, CPI is an easily interpretable figure, as a CPI of 120 indicates a 20% price increase from a given baseline year.

I use the FRED (Federal Reserve Economic Data) from the Federal Reserve Bank of St. Louis as my source of data on consumer price indices. FRED is a reputable source of economic time-series data. It shows the monthly consumer price index for many metropolitan areas across the country. Crucially, these data reach before and after the Permanent Fund Dividend was implemented in 1980 and received in 1982 for 12

metropolitan areas, including Anchorage. Therefore, we can evaluate whether the Anchorage metro region exhibits a significantly different change from the comparable metropolitan regions in the trend of its consumer price index after the permanent fund is implemented.

Using these CPI data, I ran a mixed-effects regression model. A mixed-effects model includes not only fixed effects, which apply to every observation, but also random effects, which allows the effects to vary across a clustering variable. In this case, the clustering variable is metropolitan area, such that we can capture differential effects between the Anchorage metropolitan area and the 11 other metropolitan areas that serve as control groups. While CPI serves as our outcome variable, we fit the following variables as both fixed and random predictor variables (clustered over metropolitan area): year, a pre/post intervention period binary variable, and a year: pre/post intervention interaction effect. Note that the pre/post intervention period is coded as 0 before the permanent fund dividend is implemented and 1 after it is implemented. This applies to all metropolitan areas, as we will later test whether the results are significantly different for the Anchorage metropolitan area. The month variable starts at 0 at the beginning of the pre-treatment period and starts over at 0 at the beginning of the post-treatment period. Therefore, the pre/post-intervention variable can capture the differences between pre and post-intervention, and the month and pre/post-intervention variable are not collinear.

This regression captures the change in CPI over time, as well as whether there is a differential change over time after the permanent fund is implemented. The model looks like this:

Fixed Effects:

$CPI_{ij} = \beta_{0i} + \beta_{1i}month + B_{2ij}interventionperiod + B_{3ij}\, month : interventionperiod + e_{ij}$

- CPI_{ij} is the expected value of the CPI for metro area i at month j
- β_{0i} is the expected CPI at baseline for metro area i
- β_{1i} is the expected change in CPI from a 1-unit increase in month in the pre-intervention period, holding all other variables constant
- β_{2i} is the expected change in CPI from the post-intervention period relative to the pre-treatment period, holding all other variables constant
- β_{3i} is the expected additional change in CPI from a 1-unit increase in month during the post-treatment period
- e_{ij} is the error term for metro area i at month j

Random Effects:

$\beta_{0i} = \beta_0 + \nu_{oi}$
$\beta_{1i} = \beta_1 + \nu_{1i}$
$\beta_{2i} = \beta_2 + \nu_{2i}$
$\beta_{3i} = \beta_3 + \nu_{3i}$

- β_0 is the average expected CPI at baseline
- ν_{oi} is metro area i's deviation from the average expected CPI at month=0 in the pre-intervention period
- β_1 is the average expected change in CPI from a 1-unit increase in month in the pre-intervention period
- ν_{1i} is metro area i's deviation from the average expected change in CPI from a 1-unit increase in month
- β_2 is the average expected change in CPI from the post-intervention period (1982/1980) relative to pre-treatment period
- ν_{2i} is metro area i's deviation from the average expected change in CPI from the post-intervention period (1982/1980) relative to pre-treatment period for month=0
- β_3 is the average expected additional change in CPI from a 1-unit increase in month during the post-treatment period
- ν_{3i} is metro area i's deviation from the average expected additional change in CPI from a 1-unit increase in month during the post-treatment period

Full Model:

Combining the fixed and random effects, below is the full model:

$CPI_{ij} = \beta_0 + \beta_1 month + \nu_{1i} + B_2 interventionperiod + \nu_{2i} + B_3\, month{:}interventionperiod + \nu_{3i} + e_{ij}$

I will run this model with the intervention period beginning both on April 1980, when the APFD was passed and Alaskans could expect to receive the dividend, and in July 1982, when they first received the dividend.

The key measure of each interest is $\nu_{3Anchorage}$, which is the Anchorage metro area's deviation from the average expected additional change in CPI from a 1-unit increase in month during the post-treatment period, which is called an Empirical Bayes Estimate. This estimate will help us determine whether the change in the CPI trend after the intervention period is significantly different in Anchorage from the other metropolitan areas.

By exploiting the difference in trends before and after the intervention period, this model likely eliminates many confounding factors. We would expect the Consumer Price Index and its trend over time to differ in Anchorage from other metropolitan areas for many other reasons. However, it is far less likely that the trend in CPI would change after the intervention in the Anchorage metro area relative to other metro areas from confounding factors.

While a difference-in-difference design would have allowed each metropolitan areas to have different CPI values before and after the intervention, it would not have accounted for variability by metropolitan area. Because there is only one treatment area, the Anchorage metropolitan area, the results would confound the natural differences between any two metropolitan areas and the differences due to the intervention.[44] In contrast, the Empirical Bayes estimate from this mixed effects model

[44] Gibbons, Robert D., and David E. Coleman. *Statistical Methods for Detection and Quantification of Environmental Contamination*. John Wiley & Sons, 2001, p. 205-206.

will show the relationship association between time and pre/post-intervention on CPI for each metropolitan area in the analysis. By removing the confounding natural variability by metropolitan area, we can isolate whether this effect was significantly different for the Anchorage metropolitan area from the other metropolitan areas.

Therefore, if $\nu_{3Anchorage}$ were significantly different from the other metropolitan area's deviations from β_3, we would conclude that the change in the trend of CPI after the intervention period is significantly different in Anchorage from the other metropolitan areas. Absent any other reasonable explanations for why the CPI trend would change specifically in Anchorage right after the permanent fund is implemented, the results would suggest that the permanent fund had a significant effect on consumer prices in the Anchorage metropolitan area.

My research has several underlying assumptions. One is that price changes will be visible in the Consumer Price Index and would be reflected a few years after the permanent fund dividend is implemented. This last assumption may be especially difficult, as price effects may only occur very gradually and be difficult to detect. Moreover, I have to assume that there are no confounding factors that would uniquely change the trend in the Anchorage metropolitan area's CPI after 1980 and 1982.

Qualitative Results

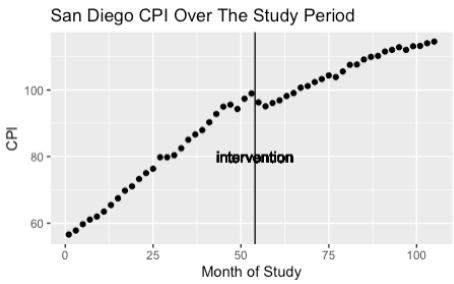
Gibbons and Coleman describe how comparing one upgradient well to several downgradient wells to compare environmental quality would confound spatial variability with differences between upgradient and downgradient wells.
Note that Dr. Gibbons is my professor, and told me that this same confounding would apply to a difference-in-difference design for this problem.

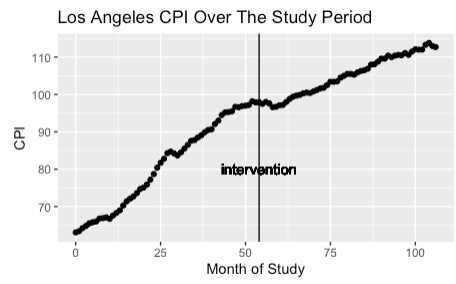
Professor Mayer argues that programs that subsidize specific goods raise prices by inducing demand for such items. “There’s some evidence that SNAP allows local groceries to raise prices. There’s analogous work on housing subsidies, and there’s some evidence that when you raise the amount of subsidies that landlords capture some of that by raising prices. There’s some of that, but that’s a little leakage.” However, because the increase in demand from cash assistance programs would be more spread out, Meyer expressed less concern on price effects from such programs. “It would be harder to detect, but it might in small effects. I wouldn’t worry about that as much as labor supply.”

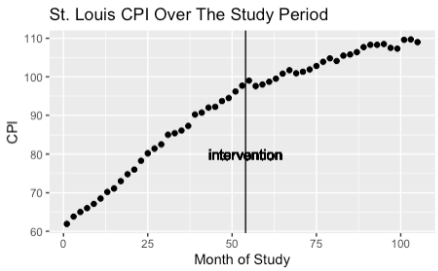
Moreover, Mayer expressed skepticism on UBI and other cash assistance programs. For Mayer, a universal cash assistance program would reduce benefits for particularly needy individuals, and eliminated needed, individualized supports beyond cash. “You either have to target the subset of individuals to provide adequate support for. If you make it universal, rather than targeting those who are disabled, have several kids and don’t have good work options, then it won’t adequately provide for those who [are particularly needy. You need to more carefully figure out who needs help and what help they need. You need social workers and people in state offices who are figuring out what people need-cash, job assistance, educational assistance, child care benefits. This naive idea that you can have this clean, simple program and that’ll work for everyone-it’s unrealistic.” He argues that instead, we should further tailor benefits to specific individual and family needs. “I’d prefer something closer to the current system-maybe with strengthened assistance offices across the states, and expanding services-is better than blowing the system, which a UBI would do.”

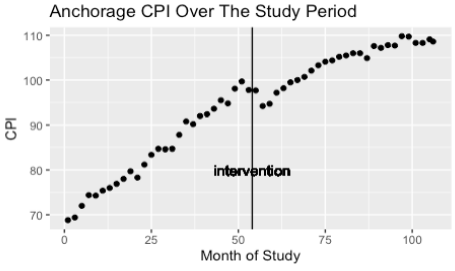
Quantitative Results

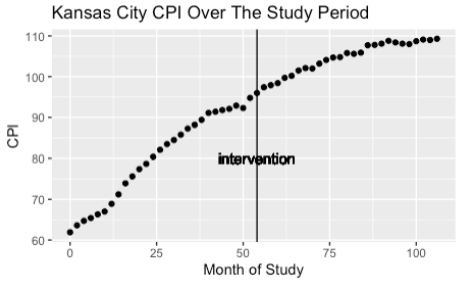
Below, I show the trend in the CPI over the 106-month study period for each metropolitan area. Note that Denver is omitted, as its plot was not displaying.

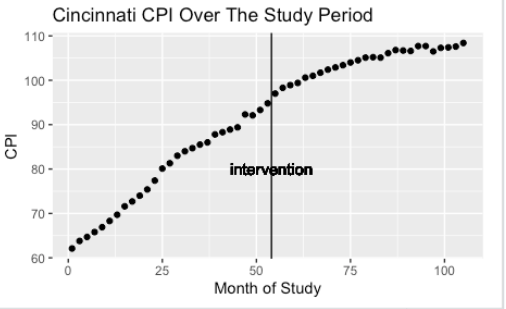


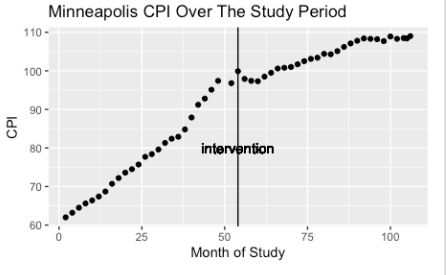


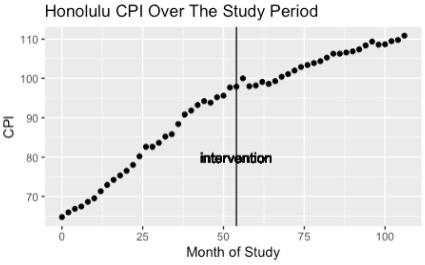


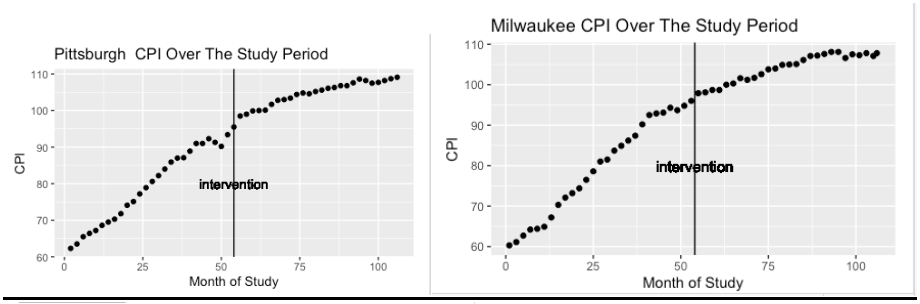


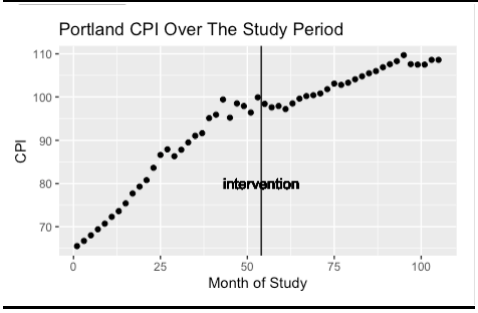












Several of the trends, including Anchorage's, exhibit a short downward slope in the few months before and after the start of intervention. I considered including a separate linear time trend for this interval but decided not to because the interval is so short, and this downward blip does not occur in several of the metro area's CPI trends.

Aside from this blip, the CPI generally slopes upward at a rate that appears similar before and after the start of the intervention period in most metro areas, including Anchorage.

Model Output and Interpretation

```
Fixed effects:
                                  Estimate Std. Error
(Intercept)                       61.73124    0.89925
CPIStudyPeriod$Intervention       35.42558    0.90427
CPIStudyPeriod$RecievedMonth       0.70338    0.01796
CPIStudyPeriod$RecievedInteraction -0.43818    0.01561
                                       df t value
(Intercept)                       13.33924   68.65
CPIStudyPeriod$Intervention       13.35759   39.18
CPIStudyPeriod$RecievedMonth      12.51127   39.16
CPIStudyPeriod$RecievedInteraction 12.36945  -28.07
                                  Pr(>|t|)
(Intercept)                        < 2e-16 ***
CPIStudyPeriod$Intervention       3.52e-15 ***
CPIStudyPeriod$RecievedMonth      1.82e-14 ***
CPIStudyPeriod$RecievedInteraction 1.42e-12 ***
---
```

```
Correlation of Fixed Effects:
            (Intr) CPISP$I CPISP$RM
CPIStdyPr$I -0.951
CPIStdyP$RM -0.834  0.690
CPIStdyP$RI  0.611 -0.734  -0.586
convergence code: 0
boundary (singular) fit: see ?isSingular
```

```
Residual
Name                                Variance Std.Dev. Corr
(Intercept)                         9.508252 3.08355
CPIStudyPeriod$Intervention         9.440872 3.07260  -0.96
CPIStudyPeriod$RecievedMonth        0.003657 0.06047  -0.84
CPIStudyPeriod$RecievedInteraction 0.002523 0.05023   0.63
                                    1.333965 1.15497
```

The fixed effects are all significant, and all are positive except for the month: intervention period interaction term. As would be expected by inflation, the CPI significantly increases over time, and is significantly greater in the treatment period than in the control period, which is later. The trend in CPI is not significantly different in the pre or post-intervention period.

<u>Interpretation of fixed effects:</u>

- Interpretation of fixed intercept:
  - The average estimated CPI at baseline (February 1978) is 61.74.
  - It is significantly greater from 0
- Interpretation of fixed intervention variable:
  - The estimated increase in CPI from the beginning of the pre-intervention to post-intervention periods is 35.42
  - It is significantly greater than 0
- Interpretation of fixed month variable:
  - The average estimated change in CPI from a 1-unit increase in month during the pre-intervention period is 0.70
  - It is significantly greater than 0
- Interpretation of fixed month: intervention period interaction variable:
  - The estimated change in the 1-unit monthly increase from pre-intervention to post-intervention is -0.44
  - It is significantly lower from 0
  - So, the average estimated change in CPI from a 1-unit increase in month during the post-intervention period is 0.26

<u>Interpretation of random effects:</u>

- Interpretation of random intercept term:
  - The estimated variance of the intercept term by metropolitan area is 9.51
  - It is significantly different from 0
- Interpretation of random intervention variable:
  - The estimated variance of the intervention variable is 9.44
  - It is significantly different from 0

- Interpretation of random month variable:
    - The estimated variance of the month variable is 0.003
    - It is not significantly different from 0
- Interpretation of random month: intervention period interaction variable:
    - The estimated variance of the month: intervention period interaction variable is 0.003
    - It is not significantly different from 0

I would have liked to plot the predictors vs. the predicted CPI values from the model, but the lmer function in R doesn't seem to have such capability.

Empirical Bayes Estimates

Now, we examine the Empirical Bayes Estimates, which describe whether there was a significant deviation in the Month : Intervention Period interaction term for each metropolitan area.

```
   CPIStudyPeriod$RecievedInteraction
1                         0.100210440
2                         0.038038810
3                        -0.013393090
4                        -0.013393090
5                        -0.013654526
6                         0.008582579
7                         0.031213943
8                         0.026185314
9                        -0.095481174
10                       -0.061162467
11                       -0.009976869
12                        0.002830130

with conditional variances for "CPIStudyPeriod$MetroArea"
```

Note that the Anchorage metropolitan area was coded as "1," so its Empirical Bayes estimate, or deviance from the fixed interaction term, is 0.100. The term's value is much higher than any other metro area's deviations. Only the Milwaukee metropolitan area's EB estimate, which is negative, is close in magnitude (it was coded as "9.") Therefore, the Anchorage metropolitan area had an estimate average decline in CPI from pre-intervention to post-intervention that was 34%, while the average decrease for the 12 metropolitan areas was 44%. I could not find the code in R to determine the standard deviations, and in turn the significance, of the Empirical Bayes Estimates.

The relatively large size and magnitude of Anchorage's Empirical Bayes Estimate suggests that the change in the CPI decreased by a moderately smaller amount during the post-intervention than the pre-intervention period in Anchorage compared to the other metropolitan regions. While the CPI still increased at a slower rate during the post-intervention period than the pre-intervention period in Anchorage, the relatively small decrease in Anchorage as compared to the other metropolitan regions suggests a moderate price increase from the APFD. As a result, my findings that a universal basic income induces inflationary price effects.

Such results not only add to the very limited research on UBI's macroeconomic effects, but impact all of the research on UBI's effects. The UBI's effects are driven by increasing the purchasing power of its recipients. The recipients of an RCT testing a $1000 cash transfer truly had $1000 more to spend, since macroeconomic effects were not at play at such a small scale. However, recipients of the APFD, and likely other real-world UBI's, would attain smaller gains in purchasing power than the dollar value of the transfer due to inflationary price effects. Therefore, the RCT results in economic security, health, well-being, and other areas that I previously discussed are likely overstated due to price effects.

Limitations

This study assumed that the CPI two constant, linear trend over this period: pre-intervention and post-intervention. As the downward blip for several metro areas, including Anchorage, showed, this was an oversimplification of the CPI trend. Moreover, the CPI trend may have changed from the pre- to the post-intervention period for unaccounted reasons that were specific to Anchorage. However, we would need a

compelling explanation for such a detectable difference in Anchorage's CPI trend from the other metropolitan regions. Moreover, we cannot assess the whether the Empirical Bayes estimates are significantly different from 0 without standard deviation terms.

There is debate over the legitimacy of the Consumer Price Index, which places the validity of my findings into question. Scholars such as UChicago economist Bruce Meyer argue that the CPI overstates inflation.[45] The Boskin Commission, a group of prominent economists appointed by the Senate Finance Committee, argued that the CPI overestimated inflation by 1.3% per year before 1993.[46] If this were true, the differential CPI trends observed in my analysis would be overstated, suggesting that the true price effects from the APFD was smaller.

Areas for Future Research

Because my method only contained a sample size of 12 metropolitan areas, and only one in the treatment group, inferring causality from the UBI was difficult. As more localities, and possibly states, implement universal basic income, researchers will have more variation in treatment and control units in order to analyze the price effects of UBI.

Moreover, researchers should further investigate other macroeconomic effects of UBI. Effects on labor supply and wages are particularly pertinent given the heated debate as to whether a UBI would disincentivizes work.[47] Moreover, consumption effects would be particularly interesting in order to see how additional income, in conjunction with the

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[45] Meyer , B. (n.d.). Measuring American Poverty: Statement of Bruce D. Meyer. Retrieved from https://harris.uchicago.edu/files/measuringamericanpoverty.pdf

[46] Meyer , B. (n.d.). Measuring American Poverty: Statement of Bruce D. Meyer. Retrieved from https://harris.uchicago.edu/files/measuringamericanpoverty.pdf

[47] Gaskell, A. (2018, March 5). Does A Universal Basic Income Discourage Work? Retrieved from https://www.forbes.com/sites/adigaskell/2018/03/05/does-a-universal-basic-income-discourage-work/#6b84a477541b

aforementioned price effects, impacts economic activity. FRED contains rich time-series data on Personal Expenditures by State.[48] As the data began in 1997, I could not use it to assess the consumption effects of the implementation of the APFD. However, as the UBI is implemented in more places, scholars could exploit this dataset.

Finally, we must further investigate how social safety net programs impact prices. A particularly interesting extension of my work would be to analyze if price effects differed under other income transfers, such as a Negative Income Tax or a child allowance.

Policy Recommendations

Since my findings are moderate and inconclusive, and only address one issue within a universal basic income, they do not suggest whether a UBI should or should not be implemented. However, the moderate price effects from the APFD suggest that policymakers must consider price increases as a key factor in the Universal Basic Income. Aside from the costs of paying for a UBI, receiving $1000 from the program does not translate to an additional $1000 of purchasing power. Moreover, policymakers should analyze the price effects of any social safety program, whether in-cash or in-kind.

At the same time, critics of UBI must reassess their position that inflation would wipe out gains in purchasing power. The Alaska case shows that price effects are contained. In fact, price increases from a UBI are likely smaller than benefits that subsidize specific items, such as SNAP or housing subsidies.

[48] Release Tables: Personal Consumption Expenditures by State, Annual. (n.d.). Retrieved from https://fred.stlouisfed.org/release/tables?rid=391&eid=216084

My findings suggest that policymakers must expand their evidence base for UBI beyond randomized control trials. Aside from the price effects that my paper demonstrated, effects on labor supply, consumption, and wages are also important factors. Therefore, experiments in which a limited number of individuals cannot accurately assess how a UBI would impact an economy. If the policy is initially implemented in different localities or states, as it already has been in Stockton, California, policymakers can more accurately assess price effects, as well as these other macroeconomic impacts.[49]

The findings favor targeted cash assistance programs over a Universal Basic Income, since targeted programs likely have smaller inflationary price effects. A Negative Income Tax (NIT) also provides guaranteed cash assistance, but the value of the transfer decreases the higher one's income is. NIT advocates argue that the program is more progressive by targeting lower-income individuals.[50] Others have proposed a child allowance, in which parents would receive a basic income for each child.[51] UBI proponents argue that the UBI would provide a smaller work disincentive than NIT, and that its universality would lower the costs of targeting and make it more politically feasible.[52] Price effects have not been featured heavily in the debate. While the price effects of these

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[49] Sarah Holder @sarahsholder Feed Sarah Holder, & CityLab. (2019, October 11). An Early Peek at What Happens When a City Gives Its Residents Money. Retrieved from https://www.citylab.com/equity/2019/10/stockton-universal-basic-income-pilot-economic-empowerment/599152/

[50] Wiederspan, J., Rhodes, E., & Shaefer, H. L. (2015). Expanding the discourse on antipoverty policy: Reconsidering a negative income tax. *Journal of Poverty*, *19*(2), 218-238.

[51] Matthews, D. (2019, December 16). Mitt Romney and Michael Bennet just unveiled a basic income plan for kids. Retrieved from https://www.vox.com/future-perfect/2019/12/16/21024222/mitt-romney-michael-bennet-basic-income-kids-child-allowance

[52] Kearney, M. S., & Mogstad, M. (2019, August 23). Universal Basic Income (UBI) as a Policy Response to Current Challenges. Retrieved from https://www.brookings.edu/wp-content/uploads/2019/08/UBI-ESG-Memo-082319.pdf

other income transfers have not been assessed empirically, they should theoretically have smaller price effects. Since fewer individuals receive means-tested transfers, demand, and in turn prices, should increase by a smaller amount. Therefore, because of price effects, NIT, child allowance, and other targeted income transfers have relatively greater impacts than UBI on recipients' purchasing power than empirical estimates suggest.

Conclusion

I tried to empirically investigate the price effects of a universal basic income in order to determine how much the program truly increases recipients' purchasing power. In order to do so, I examined whether the Consumer Price Index uniquely changed in the Anchorage metropolitan area after the Alaska Permanent Fund Dividend (APFD) was implemented in July 1982, as compared to 11 other metropolitan areas in the United States.

Based on the plots, the CPI appeared to increase at a similar rate in the 53 months before and after the intervention period began, with a short, downward blip around the time of intervention in several metro areas, including Anchorage. I computed a mixed-effects model of 12 metropolitan areas, including Anchorage, that predicted the CPI that included fixed and random of month, pre/post intervention, and a month: intervention period interaction effects. The model's terms were significant, indicating a significant average estimated increase in CPI per month, and a significant average estimated decrease in this trend from the pre- to the post-intervention periods. The Empirical Bayes estimates were by far the greatest in value and close to highest in magnitude in Anchorage. The Empirical Bayes estimate suggested that Alaska's change in monthly CPI increase is 10% higher, so its change in monthly trend decreases by 34% instead of 44%.

Despite several limitations to this approach, the results suggest modest but significant increases in general prices in the Anchorage metropolitan area after the Permanent Fund is implemented. Based on these results, policymakers should expect that price increases will modestly reduce the gains in recipients' purchasing power from a universal basic income. However, these inflationary price effects appear to not be nearly as impactful as UBI critics have stated.

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