Discussion of "Inflation's Fiscal Impact on American Households" by Altig, Auerbach, Eidschun, Kotlikoff and Ye

Adrien Auclert

Stanford

NBER Macroeconomics Annual
Cambridge, April 19, 2024

The costs of inflation

- **Q**: What are the costs of inflation?
- Classic Fisher and Modigliani article (1978, NBER wp 303!):

TOWARDS AN UNDERSTANDING OF THE REAL EFFECTS AND COSTS OF INFLATION

Stanley Fischer and Franco Modigliani*

There is no convincing account of the economic costs of inflation that justifies the typical belief -- of the economist and the layman -- that inflation poses a serious economic problem, relative to unemployment. In this paper we present a systematic account of the real effects of inflation that we hope will contribute to understanding of and continuing research on the costs of inflation.

- **This paper:** part of the continuing research on this topic

Fisher and Modigliani classification, part I

- Fisher and Modigliani proposed to answer this Q with a series of thought experiments
- Start with a "fully indexed" economy:
  - wage and price contracts are indexed
  - debt instruments are indexed, except currency (which pays 0 nominal interest)
  - tax brackets, fines, and other payments fixed by law are indexed
  - real rather than nominal returns on assets are taxed
  - there are no nominal interest rate ceilings, etc.
- Remaining effects from higher inflation in this economy:
  1. Opportunity cost from holding currency
  2. Menu costs from changing prices more frequently
- Since then: large literatures on the Friedman rule and menu costs models have measured the welfare cost of inflation through 1 and 2

Fisher and Modigliani classification, part II

- Now add in price stickiness, causing “distortions of relative prices fixed at different times”
  - This is the main cost of inflation in the NK model – we also know how to measure this
- Next add in the effects of unanticipated inflation through existing assets and liabilities fixed in nominal terms, generating “redistribution from the private to the public sector and between private debtors and creditors”
  - Doepke and Schneider (JPE 2006) started a literature measuring systematically these Fisher effects using individual data on nominal holdings.
  - They found them to be big. This shifted priors.
- Now add in the effects of nominal government institutions: imperfect indexation of tax brackets, taxation of nominal interest income and capital gains, ...
  - **This paper** quantifies this piece under current tax law using individual household data
  - In many ways parallel to Doepke and Schneider, but for the fiscal impact

Remark on this research agenda

- Valuable to get each piece of the costs of inflation in isolation
- But as Fisher and Modigliani noted, “the real effects cumulate”: someone may gain from the Fisher effect but lose from the fiscal effect
- Ideally, one would have a unified framework to quantify the overall, net effect

Doepke and Schneider findings for Fisher channel

- Their thought experiment: fix nominal contracts, imagine inflation increases by 5% forever going forward, calculate present value impact on household/sector i
- Net nominal positions (NNP) give the exposure to inflation, so

$$\frac{dPV_i}{Y} = -\frac{NNP_i}{Y} \cdot Duration_i \cdot d\pi \tag{1}$$

TABLE 2
WEALTH REDISTRIBUTION ACROSS SECTORS AFTER 5 PERCENT INFLATION EXPERIMENT

	Government		Rest of the World		All Households: Total		All Households: Losses		All Households: Gains	
Year	FS	IA	FS	IA	FS	IA	FS	IA	FS	IA
1989	+13.0	+5.2	−5.2	−3.2	−7.3	−2.2	−15.2	−5.7	+7.9	+3.5
2001	+10.8	+3.6	−7.7	−4.8	−1.2	+1.1	−8.2	−3.6	+7.0	+4.7

NOTE.—Gain or loss of each sector after a 5 percent inflation episode lasting 10 years as a percentage of U.S. GDP under two scenarios, full surprise (FS) and indexing ASAP (IA), and for two baseline years (start of the inflation episode), 1989 and 2001.

- Why? For government, $Duration \simeq 5$ years, $\frac{NNP}{Y} \simeq -50\%$, and $d\pi = 5\%$

The paper in a nutshell

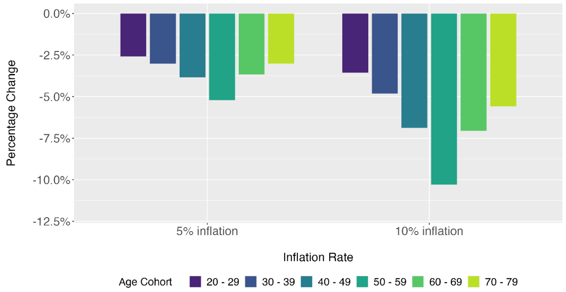
- This paper:
  1. Take household income, asset, age, pension information from 2019 SCF
  2. Project income, benefits, retirement contributions etc backward and forward
  3. Combine with mortality tables and detailed information about tax law to solve for path of consumption over remaining lifetime
  4. Rerun the optimizer under alternative inflation scenarios, enforcing $1 + i = (1 + r)(1 + \pi)$ to get $\frac{\Delta PV(c_i)}{PV(c_i)}$ for $\Delta \pi = 5\%$ and 10%
- The details look complicated, but the authors are reassuring:

> The problem TFA solves is computationally challenging for four reasons. First, there are tens of thousands of survivor-path-specific state variables. These are the levels of regular as well as spouse/partner-specific tax-deferred and Roth retirement accounts. Take, for example, a 40 year-old couple that could live to age 100. They have over 200,000 survivor contingent regular and retirement account state variables. Second, taxes, transfer payments, discretionary spending, and life insurance holdings must be determined for all years of all survivor paths. Third, spending, insurance amounts, and net taxes on any survivor path are interdependent. Indeed, they are also interdependent across paths. Hence, one needs a simultaneous equations solution. Fourth, the program needs to run in finite time.

Paper's main finding

- Average household loss from $\Delta\pi = 5\%$ is 3.5% of $PV(c)$, from $\Delta\pi = 10\%$ is 6.1%
- A lot of heterogeneity by income and age

Figure 6: Median Percentage Change in Remaining Lifetime Spending by Age Cohort



Comparison with the Fisher effect

- From Doepke and Schneider:

Net Nominal Positions of U.S. Households in 1989

Type of Instrument	Age Cohort: ≤ 35	36–45	46–55	56–65	66–75	> 75
	C. Middle Class					
Short-term	−14.6	2.0	6.2	11.0	17.6	31.7
Bonds	14.9	13.7	11.5	13.4	11.2	8.6
Mortgages	−112.6	−45.4	−20.8	−8.7	−2.3	−.9
Equity	−1.7	−1.9	−1.7	−1.7	−1.3	−1.3
Total NNP	−114.0	−31.6	−4.8	14.0	25.2	38.1

Note.—Breakdown of NNP by type of instrument held for different groups of U.S. households in 1989. Value for each group as a percentage of average net worth in the group. In each group, components sum to total NNP.

- Cumulative effect: > 55 are hurt twice, ≤ 35 barely break even?
  - Gain $114 \times 5 \times 5\% = 28.5\%$ of net worth from Fisher effect, but lose 2.5% of lifetime spending from fiscal. Lifetime spending maybe 10+ times net worth for this group?

Understanding these findings

- Relies on proprietary software (MaxiFi planner) so not the most transparent
- **Next**: simple framework to do this quantification using back of envelope
- Consider life-cycle problem for agent aged j at time $t = j + k$

$$\max \sum_{j=0}^{T} \beta^j \Phi_j u(c_{jt})$$
$$s.t. \quad P_t c_{jt} + \phi_j A_{jt} = (1 + i_t(1 - \tau_a)) A_{j-1,t-1} + (1 - \tau_2) W_t n_j + (\tau_2 - \tau_1) B_t + T_t$$

where $\Phi_j \equiv \prod_{k \leq j} \phi_k$ survival prob, $c_{jt} \equiv$consumption, $\tau_a \equiv$tax rate on interest income, $T_t \equiv$government transfer, income tax system has two rates $\tau_1 < \tau_2$ and bracket B_t

Life-cycle problem continued

- Writing $a_{jt} = \frac{A_{jt}}{P_t}$, $1+\pi = \frac{P_t}{P_{t-1}}$, $w = \frac{W_t}{P_t}$, and assuming one-period lagged indexation of tax brackets and benefits, we have:

$$c_j + \phi_j a_j = \frac{(1 + i(1-\tau_a))}{1+\pi} a_{j-1} + (1-\tau_2) w n_j + \frac{(\tau_2 - \tau_1) b + t}{1+\pi}$$

- Enforcing Fisher equation $1 + r = \frac{1+i}{1+\pi}$, we get

$$c_j + \phi_j a_j = (1 + r(1-\tau_a)) a_{j-1} - \tau_a \frac{\boldsymbol{\pi}}{\mathbf{1}+\boldsymbol{\pi}} a_{j-1} + (1-\tau_2) w n_j + \frac{(\tau_2 - \tau_1) b + t}{\mathbf{1}+\boldsymbol{\pi}}$$

- Note the two fiscal effects:
  - Taxation of nominal, not real interest implies loss from asset holding
  - Lagged indexation of brackets and benefits erodes their real value

Side note: are there enough untaxed arbitrageurs out there to enforce $1 + r = \frac{1+i}{1+\pi}$?

Impact on $PV(c)$

- Now form the present-value budet constraint to obtain:

$$PV(c_i) = -\tau_a \frac{\boldsymbol{\pi}}{\mathbf{1}+\boldsymbol{\pi}} PV(a_i) + (1-\tau_2) PV(wn_i) + \frac{PV((\tau_2-\tau_1) b_i + t_i)}{\mathbf{1}+\boldsymbol{\pi}}$$

- First-order effect on $PV(c_i)$ starting from $\pi = 0$?

$$\frac{dPV(c_i)}{PV(c_i)} = -\left(\tau_a \frac{PV(a_i)}{PV(c_i)} + (\tau_2-\tau_1)\frac{PV(b_i)}{PV(c_i)} + \frac{PV(t_i)}{PV(c_i)}\right) d\pi \qquad (2)$$

- Note similarity to (1): $\tau_a PV(a_i)$ is exposure via asset fiscal channel, etc
  - In fact the Fisher effect term comes in additively, so can just sum to get the total
- Back of envelope: $\tau_a = 30\%$, $\frac{PV(a)}{PV(c)} = 2$, $d\pi = 5\%$ gives $\frac{dPV(c_i)}{PV(c_i)} = -3\%$!
  - Also households in middle age have more $PV(a)/PV(c)$ so bigger loss

Additional questions

- How important is life-cycle optimization for these calculations?
  - Needed to get $PV(a_i)$
  - Solver assumes $EIS = 0$, so households want achieve flat c_j except for constraints
  - How sensitive are findings to $EIS > 0$? Then, π distorts consumption slope
- Conventional view that "bracket creep" was a real problem in the 1970s
  - How much worse would would the results be under pre-1981 law?

Concluding thoughts

- Great paper that is shifting my priors on the redistributive effects of inflation:

  conventional view that young, middle-class households benefit may be wrong, because undone by taxation of nominal interest later in life

- Can do more to compare to the other costs of inflation and get a comprehensive answer