THE SLOPE, NOT THE LEVEL: INFLATIONARY EXTRACTION, PURCHASING POWER, AND THE SPEED OF ECONOMIC CONVERGENCE

Azizbek Ilkhomzoda
Tashkent International University,
Xalqaro aloqalar departamenti hodimi
Email: azikilhom@gmail.com
ORCID: 0009-0009-3614-2944
https://doi.org/10.5281/zenodo.21357344

ABSTRACT

This thesis develops a dynamic political-economy interpretation of inflation in which the central welfare loss is not necessarily a fall in the level of real income, but a reduction in the speed at which household purchasing power approaches its attainable frontier. A revenue-seeking government and a representative citizenry contest each period's growth increment. The government chooses an inflationary extraction intensity, while citizens undertake costly protest that protects part of the increment. The extraction technology is tied to classical monetary theory through Cagan money demand and the Bailey measure of the welfare cost of inflation: the Laffer peak limits feasible extraction and the local curvature of the deadweight loss disciplines its cost. The model produces three regimes—convergence, stagnation, and immiseration—and shows that, within the convergent regime, inflationary extraction can leave the long-run frontier unchanged while delaying its attainment. Hence, the government appropriates timing rather than the terminal level. With noisy best responses, behavioral mistakes raise the expected capture share and are observationally equivalent in first moments to more efficient extraction, making the mechanism difficult to identify from average paths alone. A first empirical assessment uses a panel of 38 OECD economies for 1995–2023 and an event-study design around central-bank-independence reforms. The evidence is consistent with a convergence-speed channel, although it does not yet establish the mechanism conclusively. The analysis implies that monetary institutions should be evaluated not only by their effect on inflation levels, but also by whether they protect the growth increments through which living standards converge.

Keywords: inflation tax; purchasing power; convergence; seigniorage; protest; central-bank independence; bounded rationality.

JEL Classification: E31, E58, D72, H27, C73.

1. Introduction

Inflation is usually discussed through changes in observable levels: the increase in a consumer-price index, the decline in the real value of money, or the reduction in a real wage. This focus is natural, but incomplete. A household may experience rising real income every year and still lose a substantial part of the improvement that would have occurred in the absence of inflationary extraction. The missing object is the increment—the additional purchasing power generated by productivity growth, technological diffusion, and economic catch-up.

This distinction matters politically. A visible fall in living standards is easy to attribute and resist. A slower rise is harder to observe because the counterfactual path is not printed on a wage statement or a household budget. When real income continues to increase, citizens may interpret the outcome as progress even though the economy is converging toward its feasible standard of living more slowly. Inflationary finance can therefore transfer resources without necessarily producing an immediate decline in the level that households observe.

The thesis formalizes this idea as a dynamic gap-closing game. A government seeks revenue from inflation, while citizens can protect part of each period's attainable gain through costly protest and political pressure. The core claim is that extraction can operate on the speed of convergence rather than on the destination. In the model's convergent regime, purchasing power eventually reaches the same

frontier under different capture rates, but higher extraction delays the path and creates a cumulative intertemporal transfer from citizens to the government.

The contribution is threefold. First, the model connects a political conflict over growth increments to the classical Cagan-Bailey theory of seigniorage and inflation's welfare cost. Second, it derives conditions under which purchasing power converges, stagnates, or declines, rather than assuming that the level always rises. Third, it shows that noisy decision-making can mimic a technologically more efficient extractor in all first moments, which establishes a sharp identification problem for empirical work.

2. Theoretical Background

The monetary foundation begins with the idea that inflation is a tax on real money balances. Bailey (1956) measured the welfare cost of inflation as the loss of consumer surplus associated with reduced real-money demand, while Cagan (1956) showed how money demand falls with expected inflation. Phelps (1973) placed the inflation tax within optimal public finance, and Sargent and Wallace (1981) demonstrated how fiscal needs can constrain monetary policy. These approaches establish why a government may use seigniorage, but they generally concentrate on steady states and do not model a contested transition toward a purchasing-power frontier.

A second literature studies institutional restraints on opportunistic monetary policy. Kydland and Prescott (1977), Calvo (1978), and Barro and Gordon (1983) emphasize credibility and time inconsistency. The present framework differs because the government's opponent is not only private expectations. Citizens actively defend part of the contested increment through protest, organization, and political pressure. This brings the model closer to political-economy work on revolution, franchise extension, and collective action (Acemoglu and Robinson, 2000; Aidt and Franck, 2015; Passarelli and Tabellini, 2017).

A third relevant strand concerns bounded rationality. Quantal-response models allow agents to make mistakes with probabilities that decline as the payoff cost of an error rises (McKelvey and Palfrey, 1995). In many settings, such noise simply blurs behavior. Here, however, the concavity of citizens' defense technology creates asymmetric incidence: mistakes reduce expected defense effectiveness and shift a larger share of the growth increment toward the extractor.

3. A Dynamic Gap-Closing Game

3.1 Environment and law of motion

Let P_t denote real purchasing power in period t and let $\bar{P}$ be the attainable frontier. The remaining distance is $G_t = \bar{P} - P_t$. In each period, a fraction δ of this gap becomes contestable, so the new surplus is $\Sigma_t = \delta G_t$, where $0 < \delta \leq 1$. The parameter δ measures the underlying speed of diffusion and catch-up in the absence of extraction.

The government chooses an extraction intensity a_t. Citizens choose protest effort e_t, which protects the fraction φ(e_t) of the contested surplus. The defense function is increasing and strictly concave: initial organization and mobilization are effective, but additional effort has diminishing returns. The government's realized transfer is $T_t = a_t[1 - \varphi(e_t)]\Sigma_t$. Purchasing power therefore evolves according to:

$$P_{t+1} = P_t + \{1 - a_t[1 - \varphi(e_t)]\}\delta G_t,$$

$$\text{or equivalently,} \quad G_{t+1} = \rho_t G_t, \quad \text{where } \rho_t = 1 - \delta\{1 - a_t[1 - \varphi(e_t)]\}.$$

This equation reveals the central mechanism. The capture share $\kappa_t = a_t[1 - \varphi(e_t)]$ determines how much of the period's attainable improvement is diverted. If κ_t is below one, purchasing power rises, but it rises more slowly as κ_t increases. If κ_t equals one, the economy stagnates. If κ_t exceeds one, current purchasing power falls and the economy enters an immiseration regime.

3.2 Payoffs and monetary discipline

The government values the inflationary transfer but bears a convex deadweight and political cost. Citizens value the real purchasing-power gain but bear the cost of mobilization. A quadratic benchmark writes the normalized stage payoffs as:

$$u^G(a,e) = a[1 - \varphi(e)] - (\eta/2)a^2,$$

$$u^c(a,e) = 1 - a[1 - \varphi(e)] - (\gamma/2)e^2.$$

The parameter η captures the cost of inflationary extraction, including the monetary deadweight loss and institutional constraints such as central-bank independence. The parameter γ is the cost of collective action; it is lower when unions, media freedom, and political organization make protest easier.

The extraction technology can be disciplined by Cagan money demand $m(\pi) = \exp(-\alpha\pi)$. Seigniorage $S(\pi) = \pi m(\pi)$ reaches its maximum at $\pi = 1/\alpha$, producing a Laffer ceiling on feasible inflation revenue. Around low extraction, the Bailey deadweight loss is locally quadratic, and its normalized curvature is $\eta = e^{-1}$. Thus, the model's cap and cost are not arbitrary conveniences: they inherit economically meaningful restrictions from classical monetary theory.

4. Main Results

4.1 Convergence, stagnation, and immiseration

In a stationary equilibrium, the government's extraction choice and citizens' defense effort are constant, generating a constant capture share κ^*. The gap follows $G_t = \rho^tG_0$, where $\rho = 1 - \delta(1 - \kappa^*)$. Three regimes follow directly. When $0 \leq \kappa^* < 1$, $0 < \rho < 1$ and the gap closes geometrically. When $\kappa^* = 1$, $\rho = 1$ and purchasing power stagnates. When $\kappa^* > 1$, $\rho > 1$ and the gap expands, implying immiseration.

The key result arises in the convergent regime. Because the gap eventually tends to zero, the long-run frontier remains $\bar{P}$ even when the government captures part of every increment. Extraction changes the path but not the endpoint. The government therefore appropriates time: it converts faster improvement today into a delayed improvement tomorrow.

4.2 The lifetime transfer and the self-feeding tax base

Although each annual transfer may appear modest, the cumulative transfer is substantial because slower convergence keeps the remaining gap open for longer. Under the geometric benchmark, the undiscounted lifetime transfer generated by a constant capture share is proportional to $\kappa^*G_0/(1 - \kappa^*)$. As κ^* rises, both the current transfer and the duration of the tax base increase. Extraction is therefore self-feeding: by delaying catch-up, it preserves more future surplus to be contested.

This result distinguishes the model from a one-period inflation tax. The political-economy cost is not only the amount taken in the current period. It is the sequence of gains that households receive later than they otherwise would. Even when the terminal standard of living is unchanged, delay reduces discounted welfare and can have large life-cycle consequences.

4.3 Behavioral mistakes and observational equivalence

Suppose both players make noisy best responses. Because the defense function is concave, variation in protest effort lowers average effective defense by Jensen's inequality. Expected extraction therefore rises. More importantly, the average path of the noisy economy can coincide exactly with the deterministic path of an economy in which extraction is technologically more efficient. Mean levels, mean increments, and the average contraction factor cannot separately identify behavioral imprecision and extraction efficiency.

This equivalence has a practical implication: observing slow convergence does not reveal whether the government is highly capable, citizens are imprecise, or both. Identification requires second moments, institutional variation, or direct measures of protest and enforcement. Even second-moment evidence must be interpreted cautiously because cross-country heterogeneity in deterministic closure rates can generate a similar dispersion pattern.

5. Empirical Assessment

The empirical analysis is deliberately presented as a first assessment rather than a definitive test. The first exercise constructs real-wage and labour-productivity gaps for 38 OECD economies over 1995–2023. The estimated geometric persistence parameters are approximately 0.910 for wages and 0.914 for productivity. Their similarity is consistent with a common gap-closing process, but it is not uniquely predicted by the model. Simulations show that a productivity gap combined with an independent persistent wedge can reproduce comparable agreement, and the result is sensitive to a small group of high-variance catch-up economies.

The second exercise examines central-bank-independence reforms as changes in the institutional cost of inflationary extraction. A staggered event study based on 86 reform cohorts from 1972–2020 uses

the Callaway and Sant'Anna (2021) estimator. The inflation gap is approximately flat before reform, with a joint pre-trend p-value of 0.48, and contracts by roughly four percentage points within a decade after reform. This pattern is consistent with the prediction that stronger monetary institutions restrain extraction.

However, the outcome in that design is the level of inflation, not the closure rate of a real-income gap. Since many monetary theories predict that central-bank independence lowers inflation, the result cannot discriminate the proposed mechanism from standard alternatives. A decisive test would estimate whether plausibly exogenous changes in extraction intensity alter the contraction factor of purchasing-power gaps while leaving the long-run frontier stable.

Empirical exercise	Sample/design	Main result	Interpretation
Gap coupling	38 OECD economies, 1995–2023	$\hat{\theta}$wage ≈ 0.910; $\hat{\theta}$prod ≈ 0.914	Motivating regularity; not a decisive test
Institutional reform	86 central-bank-independence reform cohorts, 1972–2020	Flat pre-trend; inflation gap about 4 p.p. lower within ten years	Consistent with restraint of extraction, but outcome is not the real-income closure rate
Second moments	Cross-country dispersion of convergence paths	Positive fan-shaped dispersion	Not uniquely behavioral; deterministic heterogeneity can replicate it

6. Policy Implications

The analysis changes the criterion by which anti-inflation institutions should be judged. A policy may prevent a visible decline in real income yet still allow inflation to appropriate a large share of future growth. Indexation protects the level after prices have risen, but it may not restore the counterfactual increment that would have been realized under faster convergence.

Central-bank independence, fiscal discipline, and credible monetary rules raise the cost of extraction and should therefore speed the closure of purchasing-power gaps. Institutions that reduce the cost of collective action—free media, transparent price and wage statistics, independent unions, and accessible channels for political participation—also reduce the equilibrium capture share by making defense more effective.

Measurement policy is equally important. Statistical agencies normally publish realized wages and prices, but rarely publish a transparent estimate of the foregone growth path. Convergence accounting that separates frontier movement, catch-up, and inflationary compression would make the transfer more visible and improve democratic accountability.

7. Limitations and Research Agenda

The framework abstracts from several mechanisms that matter in practice. The frontier is treated as exogenous, although persistent inflation may reduce investment and lower the frontier itself. Citizens are represented collectively, despite heterogeneity in money holdings, wage contracts, access to indexation, and protest costs. The government is modeled as a unified actor, while actual monetary and fiscal decisions emerge from multiple institutions. Extending the model to heterogeneous households and an endogenous frontier would sharpen its distributional and growth implications.

The most important empirical task is direct identification of the speed channel. Future research should construct long panels of real wages, household consumption capacity, or purchasing-power indices relative to credible country-specific frontiers. Exogenous monetary-institution reforms, fiscal shocks, or externally imposed stabilization programs could then be used to estimate whether the gap's contraction factor changes while its terminal anchor remains stable. Such a design would test the model's distinctive prediction rather than the generic proposition that stronger institutions reduce inflation.

8. Conclusion

This thesis argues that the political economy of inflation cannot be fully understood by looking only at levels. Inflationary extraction can operate on the slope of household welfare: people continue to become better off, but more slowly than the economy's productive capacity permits. A dynamic contest over each period's growth increment makes this mechanism explicit. The model shows when purchasing power converges, stagnates, or declines; establishes that extraction can alter timing without changing the long-run frontier; and demonstrates why behavioral imprecision can be indistinguishable from a more capable extractor in average data.

The empirical evidence is suggestive rather than conclusive, but it identifies a clear research program. The relevant question is not merely whether inflation falls after institutional reform. It is whether stronger monetary institutions accelerate the closure of real-income gaps and protect the increments through which citizens approach attainable living standards. In this sense, the central welfare object is the growth households would otherwise have banked.

References

1. Acemoglu, D., & Robinson, J. A. (2000). Why did the West extend the franchise? Democracy, inequality, and growth in historical perspective. Quarterly Journal of Economics, 115(4), 1167–1199.
2. Aidt, T. S., & Franck, R. (2015). Democratization under the threat of revolution: Evidence from the Great Reform Act of 1832. Econometrica, 83(2), 505–547.
3. Bailey, M. J. (1956). The welfare cost of inflationary finance. Journal of Political Economy, 64(2), 93–110.
4. Barro, R. J., & Gordon, D. B. (1983). Rules, discretion and reputation in a model of monetary policy. Journal of Monetary Economics, 12(1), 101–121.
5. Cagan, P. (1956). The monetary dynamics of hyperinflation. In M. Friedman (Ed.), Studies in the Quantity Theory of Money (pp. 25–117). University of Chicago Press.
6. Callaway, B., & Sant'Anna, P. H. C. (2021). Difference-in-differences with multiple time periods. Journal of Econometrics, 225(2), 200–230.
7. Calvo, G. A. (1978). On the time consistency of optimal policy in a monetary economy. Econometrica, 46(6), 1411–1428.
8. Cukierman, A., Webb, S. B., & Neyapti, B. (1992). Measuring the independence of central banks and its effect on policy outcomes. World Bank Economic Review, 6(3), 353–398.
9. Doepke, M., & Schneider, M. (2006). Inflation and the redistribution of nominal wealth. Journal of Political Economy, 114(6), 1069–1097.
10. Evans, G. W., & Honkapohja, S. (2001). Learning and Expectations in Macroeconomics. Princeton University Press.
11. Friedman, M. (1969). The optimum quantity of money. In The Optimum Quantity of Money and Other Essays. Aldine.
12. Kydland, F. E., & Prescott, E. C. (1977). Rules rather than discretion: The inconsistency of optimal plans. Journal of Political Economy, 85(3), 473–491.
13. Lucas, R. E., Jr. (2000). Inflation and welfare. Econometrica, 68(2), 247–274.
14. McKelvey, R. D., & Palfrey, T. R. (1995). Quantal response equilibria for normal form games. Games and Economic Behavior, 10(1), 6–38.
15. Passarelli, F., & Tabellini, G. (2017). Emotions and political unrest. Journal of Political Economy, 125(3), 903–946.
16. Phelps, E. S. (1973). Inflation in the theory of public finance. Swedish Journal of Economics, 75(1), 67–82.
17. Sargent, T. J., & Wallace, N. (1981). Some unpleasant monetarist arithmetic. Federal Reserve Bank of Minneapolis Quarterly Review, 5(3), 1–17.
18. Selten, R. (1975). Reexamination of the perfectness concept for equilibrium points in extensive games. International Journal of Game Theory, 4, 25–55.