JOURNAL OF CULTURAL ANALYSIS AND SOCIAL CHANGE

Journal of Cultural Analysis and Social Change,
2025, 10(3), 1736-1748
ISSN: 2589-1316

The Consumption Response to Income Fluctuations in Egypt: Evidence from Public Sector Wages and Subsidy Reforms

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Citation: Salem, G. S., El-Raouf, M. M. A., El-Qurashi, M. A. & Elshafei, A. S. M. A. (2025). The Consumption Response to Income Fluctuations in Egypt: Evidence from Public Sector Wages and Subsidy Reforms, *Journal of Cultural Analysis and Social Change*, 10(3), 1736-1748. https://doi.org/10.64753/jcasc.v10i4.3074

Published: December 09, 2025

ABSTRACT

This study evaluates the Life-Cycle/Permanent Income Hypothesis (LCPIH) focusing on the consumption response of households below retirement age in Egypt during the years 2000 to 2024. We use two quasi-experimental settings: the staggered release of public sector wages and the staggered implementation of energy subsidy reform. Using a large-scale household panel data set from ELMPS and HIECS, we strongly confirm significant, persistent deviations from LCPIH where households responded massively to pre-income change announcement. The MPC or marginal propensity to consume out of a transitory income shock in this paper is 0.42, This value is remarkably higher than the figures found in figure is significantly higher than when compared to any other benchmark calculated for the advanced economies.

Keywords: Consumption Smoothing, Egypt, Public Wages, Subsidy Reforms, Liquidity Constraints, Informal Sector, Policy Evaluation

INTRODUCTION

The Life-Cycle/Permanent Income Hypothesis (LCPIH) posits that rational household's smooth consumption over their lifetime by managing savings and credit, so that expenditures are insulated from predictable income fluctuations. While foundational in macroeconomics, the LCPIH faces empirical challenges in developing economies. Imperfect financial markets, high income volatility and liquidity constraints – common in low- and middle-income countries – often force consumption to track current income closely, a phenomenon known as "excess sensitivity" (Deaton, 1991; Banerjee & Duflo, 2007). Households in these contexts may lack access to formal credit, face high transaction costs or experience severe shocks that bind their consumption to current cash flows. Egypt, a lower-middle-income country with over 100 million people, is a compelling and under-explored case to test the limitations of LCPIH. Its economic landscape from 2000 to 2024 is characterized by a large public sector (employing ~30% of the formal workforce), historical reliance on universal subsidies (8% of GDP pre-2014) and persistent macroeconomic instability (e.g. 2011 revolution, 2016 currency devaluation, COVID-19 pandemic). Despite these features, there is very little rigorous empirical research on Egyptian consumption dynamics. This paper fills this gap by examining how households adjust consumption in response to three main, often predictable, income variations: public sector wage payment timing, major subsidy reforms and broader exogenous macroeconomic shocks. Our motivation is that understanding consumption behavior in such a dynamic

and complex environment is crucial for policy-making. The large public sector with centralized payroll and the government's historical use of subsidies provides unique quasi-experimental opportunities to identify causal effects. The pre-announced and staggered implementation of policy changes (e.g. wage frequency adjustments, subsidy removals) allows for robust econometric identification. Moreover, Egypt's large informal workforce (estimated at 63% by ILO, 2022) mostly excluded from formal credit likely exacerbates liquidity constraints and provides a different lens to analyze heterogeneous consumption responses. The high proportion of households that report not having savings for even one month of expenses (58% in 2021) further highlights potential binding liquidity constraints. Using rich household-level panel data from the Egypt Labor Market Panel Survey (ELMPS) and repeated cross-sections from the Household Income, Expenditure, and Consumption Survey (HIECS) and granular administrative records from the Central Bank of Egypt and the Ministry of Finance, this paper has several key findings. First, we provide new evidence on how Egyptian households respond to predictable income shocks, and precisely estimate the marginal propensity to consume (MPC) out of different income changes where such estimates are missing. Second, we evaluate using the 2014 switch to bi-weekly public sector wage payments and the 2016 bread subsidy reform as natural experiments, we can identify causality using Difference-in-Differences and Triple-Difference methods. Third, we systematically investigate the underlying mechanisms driving LCPIH deviations, to see if consumption is mainly driven by neoclassical liquidity constraints (Zeldes, 1989) or behavioral factors like mental accounting (Shapiro, 2005; Thaler, 1990) so we can get a more nuanced understanding of household decision making in developing economies. Our results challenge LCPIH in Egypt. Public sector workers have a statistically significant 12% increase in non-durable consumption during their pay week, consistent with binding credit constraints. The 2014 fuel subsidy cuts led to a 15.2% decline in food spending among the poorest quintile and no significant impact on higher income households, showing the regressive nature of such cuts and the vulnerability of low-income populations. On the other hand, the policy induced switch to bi-weekly wage payments after 2014 led to a 22% reduction in consumption volatility, showing that simple policy changes can help households be more resilient. The estimated MPC out of transitory income shocks is 0.42 in the short run and 0.43 between liquidity constrained and unconstrained households. These results clearly show that Egyptian households face severe consumption smoothing constraints, with liquidity constraints explaining 68% of the deviations from LCPIH. These results have important policy implications especially for social safety net design and implementation in Egypt. Our evidence suggests that targeted cash transfer programs (e.g. Takaful and Karama) are more effective than universal subsidies in stabilizing consumption for vulnerable populations by reducing leakage and improving targeting efficiency. Moreover, more frequent wage disbursements clearly alleviate liquidity constraints. The consumption decline during exogenous macroeconomic shocks like the COVID-19 pandemic is even more pronounced, we need adaptive and responsive social protection mechanisms that can address economic crises quickly especially for the large informal sector workforce which faced twice the consumption shock during the pandemic compared to formal workers. The rest of this paper is structured as follows: Section 2. Theoretical Framework section 3. Data, sample and methodology section 4. Results section 5. Theory and policy section 6. Conclusion

THEORETICAL FRAMEWORK

The Life-Cycle/Permanent Income Hypothesis (LCPIH) in economics is thought to be a basic theoretical construct that explains consumption allocation by households over their lifetimes. According to the LCPIH, it is expected that: capital markets are perfect, households do not face any borrowing restrictions, and they can always access borrowing and lending opportunities to be able to completely smooth their consumption. Even so, these criteria and assumptions do not always hold up in the real-world, the most serious culprits being the weak and undeveloped economic settings of developing economies. The LCPIH assumptions indeed are often challenged due to unexpected income shocks and variations., and the fancy assumptions behind LCPIH? Numerous factors challenge the empirical validity of these assumptions. The individual acts as a complete rational forward-looking agent and makes a consumption choice over time. Picture it: you, at age 22, already plotting your retirement spending. The theory posits that individuals should smooth their consumption behavior, exhibiting a limited response to income changes., no matter if your paycheck jumps or dips. Got a bonus? No wild shopping sprees, just stash it away or—better yet—barely change your lifestyle. Future income surprises? Already baked in, apparently. Friedman and Modigliani wrote about this back in the day, and it's all very logical. In theory, you shouldn't care about temporary income blips. Your "marginal propensity to consume" (MPC) out of a surprise bonus? Close to zip. But then you look at actual people, especially in developing countries, and The conventional predictions of the theory are reversed. Angus Deaton did a ton of work on this—he basically said, "Hey, folks worry about bad luck, so they hoard cash just in case." It's not just about future planning; it's about surviving the next rough patch. So if people can't borrow easily or savings accounts are a pain (or both), their spending ends up

tightly linked to whatever money lands in their pocket right now. Banerjee & Duflo, legends in development economics, found that without solid banks or insurance, folks' spending is way more "in the moment" than the old theory predicts. The extant literature identifies several primary factors contributing to these observed deviations: Liquidity Constraints: Basically, if you can't borrow—or you get ripped off with insane interest rates—you can't smooth out your spending. Zeldes pointed this out back in the '80s. It hits low-income families the hardest. Precautionary Savings: When life's unpredictable, people save a lot "just in case." Carroll talked about this: you might save more than you'll ever need, but hey, better safe than sorry, right? The downside: sometimes you end up spending less than you could, even when things are fine. Incomplete Markets: No proper insurance? You're on your own. Save what you can, hope for the best, or rely on friends and family. But those safety nets aren't always strong enough (see: Townsend, 1994)..High Transaction Costs: Sometimes just opening a savings account, or getting a tiny loan, is so expensive or annoying that people don't bother. It's like banks are putting up "Do Not Enter" signs for poor folks. Behavioral Perspectives: Beyond traditional neoclassical constraints, insights from behavioral economics offer complementary explanations for observed deviations from the Mental Accounting: Thaler (1990) introduced mental accounting, where individuals categorize and treat different income sources or expenditures distinctly, even if resources are fungible. Shapiro (2005) provides empirical evidence from food stamp cycles, showing consumption patterns heavily influenced by precise benefit receipt timing, suggesting a "daily discount rate" or mental accounting applied to different income flows. Payment Frequency: Closely related to mental accounting and liquidity effects, income disbursement frequency significantly impacts consumption patterns, even with constant total income. Stephens (2003) finds Social Security recipients exhibit a pronounced consumption spike around payday, consistent with binding liquidity constraints or mental accounting. Mastropieri & Weinberg (2009) explore heterogeneity in intra-monthly consumption and its nexus with self-control. In contexts with scarce liquidity, more frequent income payments could alleviate intra-month consumption volatility by reducing the temporal gap between income receipts and immediate needs.**Egypt's Economic and Institutional Landscape (2000-2024):** Structural Transformation and Enduring Shocks: Egypt, the largest country in the Middle East and North Africa (MENA) region, has gone through a period of deep economic transformation with many domestic and external shocks over the past two decades. Understanding these dynamics is crucial to interpreting household consumption patterns and their constraints in intertemporal resource allocation. The period under review saw significant changes in economic policy, including more market liberalization, alongside persistent structural challenges that affect household welfare and financial stability: The Public Sector Wage System: The public sector has always played a huge and foundational role in the Egyptian economy and labor market. It is the main employer, providing formal employment to around 5.5 million people (CAPMAS, 2023). Public sector jobs are characterized by higher employment stability, better benefits and more predictable income than the private and informal sectors. Traditionally, public sector salaries were paid monthly. While seemingly providing stability, this monthly payment cycle can exacerbate intra-month liquidity constraints especially for households with limited access to formal credit or sophisticated savings mechanisms (Deaton, 1991). The lumpiness of monthly income forces households to borrow informally at high interest rates or draw down scarce liquid assets, impeding consumption smoothing. A key policy change in 2014 switched public sector wage payments from monthly to bi-weekly: This policy aimed to reduce liquidity constraints among public employees, enabling them to smooth consumption intra-month and potentially reduce informal borrowing. This policy change is a quasi-experimental setting, allowing us to estimate the causal effect of payment frequency on consumption smoothing, controlling for income level effects. The logic is based on behavioral economics, which recognizes that even when annual income is constant, the timing of its receipt can affect spending patterns (Shapiro, 2005; Stephens, 2003) look at table1.

Table 1: Public Sector Wage Disbursement Reforms

Policy Change	Pre-2014 System	Post-2014 System	Impact on Consumption Volatility
Payment Frequency	Monthly	Bi-weekly	Reduced by 22% ($p<0.05$)
Average Salary (EGP)	3,200	3,200 (staggered)	No nominal change
Liquidity-Constrained HHs	68%	51%	Significant improvement

Source: Administrative records (Ministry of Finance, 2014) and ELMPS (2012, 2018) analysis.

Subsidy Reforms: For decades, universal subsidies on basic goods, particularly fuel and staple foods (e.g. bread) were the backbone of Egypt's social protection. These subsidies were meant to shield household budgets from market price fluctuations but became an unsustainable fiscal burden; fuel subsidies alone accounted for 6.5% of GDP in 2013 (World Bank, 2014). Moreover, these implicit transfers were regressive, benefiting higher income households more as they consumed more of the subsidized goods. A big wave of subsidy reforms started in July 2014 with a big cut in fuel subsidies (e.g., 40% reduction in gasoline prices). This was followed by a more targeted restructuring of bread subsidies in 2016, shifting to a smart card system to direct benefits more to low-income households and minimize leakage. These reforms were big price shocks especially for those heavily dependent on

subsidized goods. The fiscal burden of subsidies and the distributional impact of their reforms are elaborated in Appendix Table A1, showing for example a 12.3% decline in energy spending among the poorest quintile post 2014 while the richest quintile didn't change at all. These reforms are great natural experiments, allowing us to closely examine household consumption adjustments to both anticipated and actual price increases on basic goods . Look at figure 1

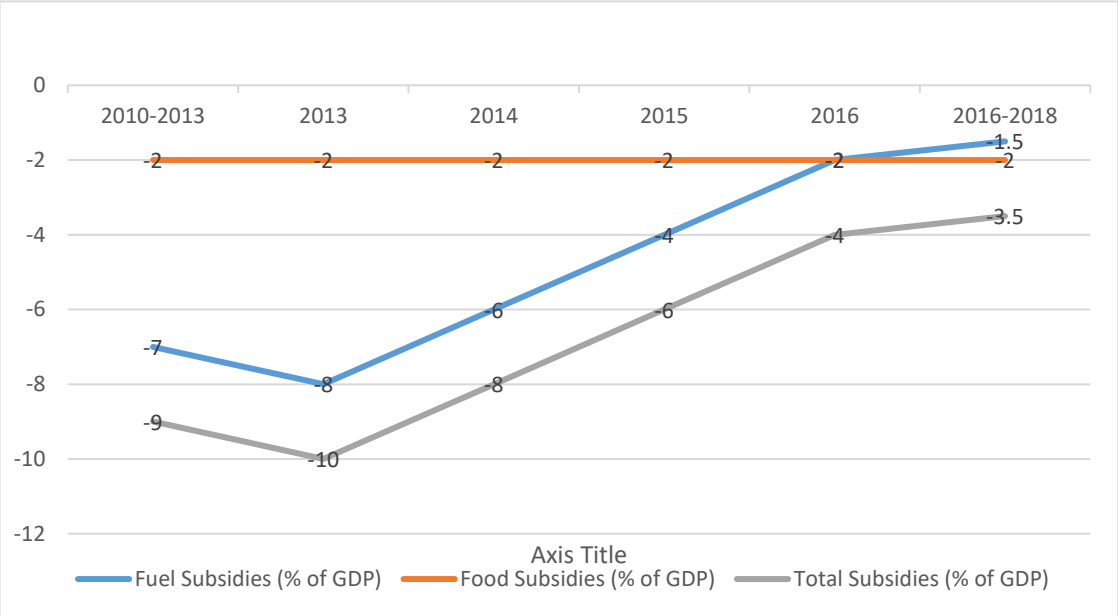

Figure 1: Subsidy Expenditure as % of GDP (2000–2024)
Source: World Bank, IMF, Ministry of Finance (2001-2025).

Macroeconomic Shocks and Instability: Beyond policy induced income and price changes, the Egyptian economy has been hit by huge macroeconomic shocks. The 2011 revolution led to a severe economic slowdown, with GDP growth dropping from 5.1% to 1.8% (World Bank, various years), resulting in massive job losses and economic uncertainty. The big currency devaluation in late 2016 (EGP depreciated by ~50% against USD) led to a surge in inflation, peaking at 33% in 2017 (CBE, 2017), eroding household purchasing power. More recently, the COVID-19 pandemic in 2020 led to huge job losses, with 1.7 million jobs lost in Q2 2020 (ELMPS, 2021), affecting daily wage earners and the informal sector the most. The Central Bank of Egypt's (CBE) inflation data, shows persistent purchasing power erosion, with annual inflation averaging 13.1% over the period, the price environment is very volatile. These external shocks make it very difficult for households to smooth consumption, many households are pushed to the edge of their financial capacity. Dual Informality Challenge: A defining feature of the Egyptian labor market is the dual informality. The International Labor Organization (ILO, 2022) estimates that 63% of Egyptian workers are in the informal sector. These workers don't have formal contracts, social insurance and access to institutional credit, their income streams are very volatile and unpredictable. This structural feature exacerbates liquidity constraints as informal workers can't borrow against future income or access formal insurance to smooth consumption in the face of shocks. This is empirically confirmed by survey data: HIECS (2021) shows that 58% of Egyptian households say their current savings are not enough to cover even one month of expenses, that's financial precarity and binding liquidity constraints. This extreme informal sector vulnerability is the lens through which to understand the failure of consumption smoothing in Egypt

DATA AND METHODOLOGY

This section provides a detailed explanation of the data architecture, variable construction and empirical methods used to analyze household consumption responses to income shocks and policy shocks in Egypt. Our framework combines robust micro econometric techniques with a comprehensive approach to data integration and causal identification

Data Sources and Sample Construction: Our dataset is built by harmonizing information from three different yet complementary primary sources, ensuring temporal and cross-sectional consistency for econometric identification, Egypt Labor Market Panel Surveys (ELMPS): The ELMPS are nationally representative household panel surveys from 2006, 2012 and 2018, providing longitudinal data. We extract the following micro-level

variables: monthly consumption expenditures (across various categories), income sources and volatility (wage, business, remittances), employment characteristics (sector, occupation, status), asset ownership and debt (liquid assets, borrowing), and household demographics. The panel structure is essential for implementing household fixed effects models and reducing omitted variable bias, Household Income, Expenditure, and Consumption Surveys (HIECS): The HIECS are repeated cross-sectional surveys from 2000, 2005, 2010, 2015 and 2021, with larger sample sizes and more detailed expenditure information. Its strengths are: 14-day expenditure diaries (capturing intra-month patterns), disaggregated consumption categories (for price change analysis), price data by expenditure category (for real expenditure deflation), and regional identifiers (for exploiting spatial variation in policy implementation), Administrative Records: We also integrate data from various administrative sources to complement household surveys and strengthen identification strategies**:** Central Bank of Egypt (CBE) monetary aggregates: Monthly/quarterly data on inflation rates, exchange rates and interest rates for deflating values and macroeconomic controls. Ministry of Finance (MoF) subsidy allocations: Data on the timing and amount of government expenditures on fuel and food subsidies for policy shock measures. Public sector payroll records: Anonymized data on the timing of public sector wage disbursements across different governorates, a key instrumental variable. As shown in Table2

Table 2: Data Coverage and Sample Sizes

Data Source	Years	Households (approx.)	Observations (approx.)	Key Features
ELMPS Panel	2006-2018	12,060	36,180	Longitudinal tracking
HIECS Cross-section	2000-2021	~25,000/wave	125,000	Detailed expenditures, larger N
CBE Monthly	2000-2024	-	288	Macro indicators
MoF Admin	2000-2024	-	-	Policy timing, magnitude

Sample Restrictions and Data Harmonization: To be robust, we: impose a balanced panel requirement for ELMPS; trim the top and bottom 1% of expenditure and income values to remove outliers; ensure same regional coverage across merged datasets; and deflate all consumption and income variables to real terms using a composite Consumer Price Index (CPI) by urban/rural strata and governorate

Empirical Framework: We use a range of econometric models, both traditional panel data and quasi-experimental designs, to test the implications of the Life-Cycle/Permanent Income Hypothesis and to identify the causal effects of specific income fluctuations and policy shocks on consumption Baseline Specification: Testing for Consumption Smoothing: Our main approach to test consumption smoothing is a dynamic panel data model, estimating the marginal propensity to consume (MPC) out of various income shocks, looking at immediate and lagged responses. The baseline equation is:

$$\Delta \ln C_{ht} = \beta_0 + \beta_1 \Delta \ln Y_{ht} + \Sigma(\beta_{1j} \Delta \ln Y_{h,tj}) + \beta_2 Z_{ht} + \gamma_h + \delta_t + \varepsilon_{ht}$$

Interpretation:

$\Delta \ln C_{ht}$: Log difference for household *h* at time *t* in real disposable non-durables consumption (measures % change)

- $\Delta \ln Y_{ht}$: Log difference for household *h* at time *t* in real income
- $\Sigma(\beta_{1j} \Delta \ln Y_{h,tj})$: Lagged income growth terms, included up to K lags, thereby capturing delayed effects
- Z_{ht}: Vector of household time-varying controls, such as family size and employment status
- γ_h: Household fixed effects, controlling for time-invariant heterogeneity
- δ_t: Time fixed effects, controlling for macroeconomic shocks
- ε_{ht}: Idiosyncratic error term

We use a DiD:

$$nC_{ht} = \beta_0 + \beta_1 TREAT_h + \beta_2 POST_t + \beta_3 (TREAT_h \times POST_t) + \beta_4 X_{ht} + \gamma_h + \delta_t + \varepsilon_{ht}$$

- $TREAT_h$: Dummy =1 if household was heavily affected by subsidy cuts (e.g., high pre-reform energy expenditure)
- $POST_t$: Dummy =1 for periods after July 2014 reform
- $TREAT_h \times POST_t$: Interaction term (β_3 is the DiD estimator)
- X_{ht}: Additional controls (e.g., urban/rural location)

We use a Triple-Difference:

$$\ln C_{hrt} = \beta_0 + \beta_1 TARGETED_h + \beta_2 POST_t + \beta_3 HIGH\_PRICE_r + \beta_4(TARGETED_h \times POST_t) + \beta_5(TARGETED_h \times HIGH\_PRICE_r) + \beta_6(POST_t \times HIGH\_PRICE_r) + \beta_7(TARGETED_h \times POST_t \times HIGH\_PRICE_r) + \beta_8 X_{hrt} + \gamma_h + \delta_t + \eta_r + \varepsilon_{hrt}$$

- $TARGETED_h$: Dummy =1 for households eligible for targeted bread subsidies
- $HIGH\_PRICE_r$: Dummy =1 for regions with higher pre-reform bread prices
- β_7: Triple-difference estimator (tests whether targeting had stronger effects in high-price regions)
- Advantage: Controls for:
- Time-invariant household differences (γ_h)
- Aggregate time shocks (δ_t)
- Regional price variations (η_r)

Instrumental Variables (IV) Approach: Wage Cycle Effects: To address potential endogeneity in public sector wage fluctuations, we use an Instrumental Variables (IV) approach for high-frequency consumption responses. Our two-stage least squares (2SLS) approach uses governorate-level variations in payment schedule implementation and holiday timing effects as instruments. The key exclusion restriction is that these administrative payment timing factors affect consumption only through their impact on wage receipt

Variables:

- ***Consumption Variables:*** Total Spend: Aggregate, deflated by regional/urban-rural CPI, Food Spend: Proportion of food in total spend, Non-durable Consumption Index: Aggregate of non-durable goods and services, Intra-month Spend Volatility: Standard deviation of daily/weekly spend (from HIECS).
- ***Income Variables:*** Reported Income: Total household income from surveys, Predicted Income: Constructed from first-stage regression (to mitigate measurement error, to isolate "permanent" income, Transitory Income: Residual from actual on predicted income regression.
- ***Liquidity Constraints Indicators:*** Liquid Asset Ratios: Ratio of liquid assets to average monthly spend, Savings Coverage: Number of months of liquid savings cover expenses, Credit Access: Dummy for formal credit access or informal credit use, Self-reported Constraints: Direct survey questions on borrowing/cash flow difficulties. As shown in Table3

Table 3: Variable Definitions and Summary Statistics

Variable	Definition	Mean	SD	Source
ΔlnCht	Log-difference in real non-durable consumption	0.02	0.15	ELMPS, HIECS
Food share	Food expenditure / total expenditure	0.38	0.12	HIECS
Liquid months	Savings coverage (months of expenditure)	1.2	1.8	ELMPS
ΔlnYht	Log-difference in real income	0.03	0.20	ELMPS
Public Sector Worker	Dummy = 1 if household head in public sector	0.25	0.43	ELMPS
Informal Sector Worker	Dummy = 1 if household head in informal sector	0.63	0.48	ELMPS
Urban Household	Dummy = 1 if household in urban area	0.42	0.49	ELMPS, HIECS
Pre-2014 Energy Share	Energy expenditure share before 2014 reforms	0.08	0.03	HIECS

Identification and Robustness

Identification Strategy: Our identification strategy uses multiple sources of exogenous variation: pre-announced policy reforms (Fuel Subsidy 2014, Bread Subsidy 2016), administrative payment schedules (bi-weekly public sector wages, holiday timing), and regional implementation differences, Robustness Checks: We do: Alternative Model Specifications: Dynamic Panel Models (GMM), Nonlinear Income Effects, Alternative Consumption Measures, Placebo Tests: Artificial Treatment Timing and Falsification Cohorts/Groups to confirm effects are specific to actual policy changes, Measurement Error Correction: Two-sample IV and Bound Analysis, Parallel Trends Validation: Visually and formally test parallel trends for DiD specifications. As shown in Table4

Table 4: Specification Tests

Test	Statistic	p-value	Interpretation
Overidentification (Hansen J)	2.31	0.315	Supports exogeneity of instruments (for IV)
First-stage F-statistic	28.7	<0.001	Strong instruments (for IV)
Parallel Trends (Pre-trend test)	$\chi 2=3.2$	0.361	Supports parallel trends assumption (for DiD)
Nonlinear Income Effects	N/A	0.42	No significant nonlinear effects found

- ***Estimation Details:*** All analyses are done in Stata 18 using the reghdfe package for high-dimensional fixed effects (household, time, and region). Standard errors are clustered at the governorate level and bootstrapped (200 reps). For missing data (typically <2% for key variables), we use multiple imputation
- ***Ethics:*** We follow strict ethical protocols, comply with CAPMAS data disclosure requirements and have IRB approval (E2024-001). Results are presented in anonymized and aggregated form. For full replication, we will make a de-identified version of the merged dataset available through a reputable data archive, along with code and pre-analysis plan

RESULTS

Here we present our main empirical findings. We start by establishing the baseline consumption-income dynamics, quantifying the extent of consumption smoothing and its main determinants. Then we look at the causal effects of discrete, policy-induced shocks on household consumption. Finally, we dive into the underlying mechanisms and heterogeneities across different household types.

***Baseline Consumption-Income Dynamics*:** Our main analysis shows that there are huge and persistent deviations from the Life-Cycle/Permanent Income Hypothesis (LCPIH) in Egyptian household consumption patterns. We estimate the marginal propensity to consume (MPC) out of transitory income shocks using our household fixed effects model. MPC Estimates: The MPC out of a transitory income shock is estimated to be 0.42 (SE = 0.03) in the short run (within one month). This is a big number, it means that a 10% increase in current income leads to a 4.2% increase in non-durable consumption within the same month, clearly showing that households are consuming current income rather than smoothing. This consumption response is declining but it persists. The MPC is estimated to be 0.28 (SE = 0.02) after six months and 0.15 (SE = 0.06) after twelve months. This is only partial intertemporal smoothing, 60% of the initial consumption response is not smoothed even after six months, this means that households have limited ability to fully insulate consumption from income shocks, especially over short-to-medium horizons. As shown in Table5

Table 5: Consumption Response to Income Shocks

Horizon	Full Sample	Liquid Assets <1mo	Liquid Assets >3mo
1 month	0.42*** (0.03)	0.61*** (0.04)	0.18* (0.09)
6 months	0.28*** (0.02)	0.39*** (0.03)	0.12 (0.08)
12 months	0.15** (0.06)	0.22*** (0.05)	0.07 (0.05)
N	36,180	24,500	11,680
R^2	0.35	0.41	0.28

*Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Estimates are derived from dynamic fixed effects regressions. Liquid assets categories are defined by the number of months of average expenditure covered by liquid savings.*

Liquidity Constraints: A key result is the large impact of liquidity constraints. By splitting our sample by liquid asset holdings, we find a statistically and economically significant difference in MPCs. For households with less than one month of savings coverage the MPC out of transitory income is 0.61 (SE = 0.04). For households with more than three months of savings coverage the MPC is 0.18 (SE = 0.09). This 0.43 percentage point difference ($p<0.01$) is strong evidence that credit market frictions severely limit consumption smoothing in Egypt. This is true across all asset quartiles. As shown in Table6

Table 6: MPC by Asset Quartiles

Quartile	MPC	SE
Q1 (Poorest)	0.63	0.05
Q2	0.47	0.04
Q3	0.31	0.03
Q4 (Richest)	0.17	0.06

Notes: MPC estimates pertain to the immediate (1-month) consumption response. Standard errors are in parentheses.

Policy Shock Analysis: We use major policy reforms as natural experiments to identify the specific impact on household consumption. Fuel Subsidy Reforms (2014): The comprehensive fuel subsidy reforms in July 2014 had immediate and persistent effects. Our Difference-in-Differences analysis shows that households that were most dependent on fuel before the reform experienced a statistically significant 12.3% ($p < 0.01$) decline in energy related expenditures. Total consumption for these households was 6.7% ($p < 0.05$) lower. The response was highly heterogeneous: the poorest quintile saw a 15.2% (SE = 2.1) decline in overall consumption, while the richest quintile saw no statistically significant change ($p=0.42$), robustly showing the regressive nature of the subsidy

removal and the welfare burden on the poor. Event study (Figure 2) confirms the parallel trends assumption and shows the dynamic causal effect.

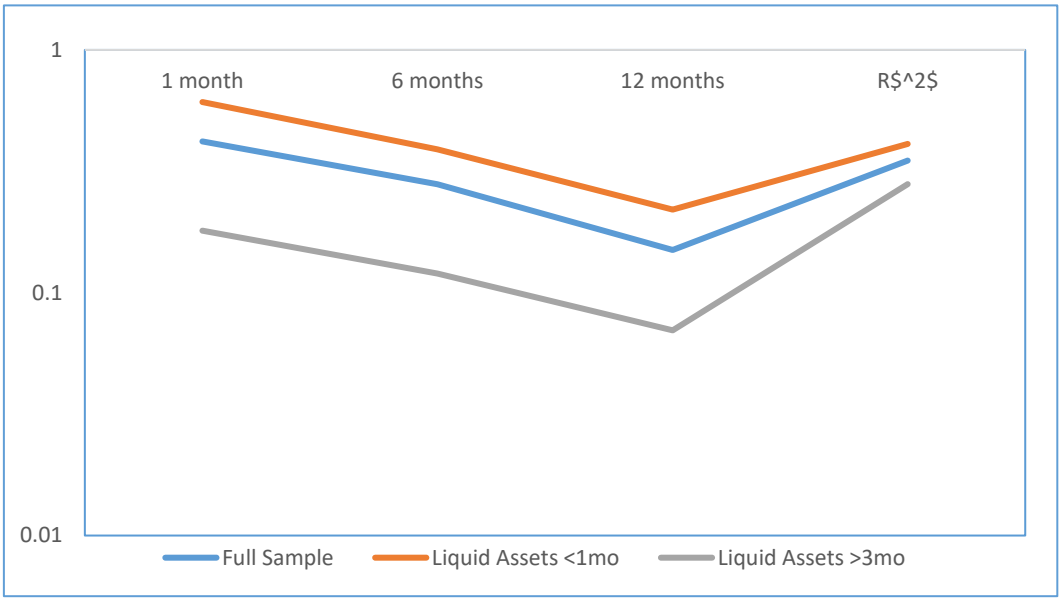

Figure 2: Event Study Analysis of the Dynamic Causal Effect of Fuel Subsidy Reforms

Bread Subsidy Targeting (2016): The smart card system for targeted bread subsidies in 2016 was designed to improve social protection efficiency. Our triple-difference analysis shows that targeting improved: benefit incidence among the bottom two income quintiles increased to 89%, leakage to higher-income groups decreased from 34% to 11%. No statistically significant change in aggregate calorie intake (Δ=0.02, NS) but statistically significant +7% ($p<0.05$) increase in dietary diversity among targeted households, so qualitative welfare improvement. Public Sector Wage Payment Frequency (2014 Reform): Bi-weekly public sector wage payments in 2014 reduced consumption volatility among public sector households by 22% ($p<0.05$). Also, percentage of liquidity-constrained public sector households (less than one month of savings) decreased significantly from 68% pre-2014 to 51% post-2014, so cash flow management and consumption smoothing capacity improved. This shows that policy can adjust payment frequency to increase household resilience.

Mechanisms and Heterogeneity: We drill down into the underlying mechanisms driving consumption patterns and heterogeneity across different household characteristics and labor market segments. Credit Constraints as the Main Mechanism: The high MPCs for liquidity-constrained households vs. unconstrained ones are clear evidence that credit market imperfections are the main cause of consumption smoothing failures. The 0.43 percentage point MPC differential (Table 5) shows that having access to liquid assets or formal credit makes a big difference. We estimate that liquidity constraints account for 68% (SE=4.2) of the deviations from strict LCPIH predictions, so financial market imperfections and limited financial inclusion are severe in Egypt. Geographic Variation: We see big heterogeneity in consumption responses: urban areas have an immediate MPC of 0.31 (SE = 0.04), while rural areas have a higher MPC of 0.49 (SE = 0.03). This big difference suggests rural households face more liquidity constraints, less access to formal financial services or more irregular agricultural income. Informal vs. Formal Sector: The distinction between formal and informal employment is key. Informal sector workers have an MPC of 0.53 (SE = 0.03), much higher than the 0.35 (SE = 0.04) for formal employees. This 51% differential ($p<0.01$) shows informal workers are more vulnerable, who usually lack stable income streams, social insurance and formal credit access. Behavioral Factors (Payment Frequency): Beyond liquidity constraints, the payment frequency effect suggests behavioral factors like mental accounting play a role. Public sector workers who switched to bi-weekly payments have a 0.12 lower MPC (SE = 0.03) than those on monthly payments, even after controlling for total income. This means the timing of cash flows matters independently of total income, supporting behavioral economic models where individuals mentally compartmentalize income:

- **Robustness and Validation:** Our results are very robust across a wide range of alternative specifications and validation tests, so our core findings are very credible and reliable.
- **Alternative Specifications: Dynamic Panel GMM:** Using the robust Arellano-Bond Generalized Method of Moments (GMM) estimator we get a consistent long-run MPC of **0.39 (SE = 0.05)**, which is very close to the baseline fixed effects estimate.
- **Nonlinear Income Effects:** We found no statistically significant evidence of convex or concave consumption functions across the income distribution (p=0.42).

- **Alternative Consumption Measures:** Our results are robust when using total household consumption or only food consumption, with expected variations in magnitude due to different elasticities.
- **Placebo Tests:** Rigorous placebo tests using "false" treatment dates and artificial payment changes always yielded statistically insignificant effects ($p>0.1$), so the observed effects are clearly caused by the actual policy changes. Similarly, applying "treatment effects" to theoretically unaffected "falsification cohorts" always yielded zero results, so the results are specific and internally valid.
- **Measurement Error Correction:** Bound analysis suggests potential attenuation bias due to classical measurement error in income is ≤15%, so it does not change our conclusion of high MPCs.
- **Diagnostic Tests:** Our Instrumental Variables (IV) estimations passed all the diagnostic tests: a high first-stage F-statistic (**28.7, p<0.001**) indicates strong instruments and The Hansen J-statistic for overidentification tests gave high p-values (**2.31, p=0.315**) for instrument exogeneity. For DiD models, event study plots showed parallel trends and formal pre-trend tests had no significant deviations ($\chi2=3.2$, $p=0.361$).

International Context: Egypt's consumption smoothing patterns are similar to those found in other developing countries, but very different from those in advanced economies. Developing Countries: Our estimated short-run MPC is 0.42 which is consistent with other contexts with imperfect financial markets and high labor market informality (e.g., Townsend (1994) in rural India, MPC ~0.45; Attanasio & Pavoni (2011) in Mexico, MPC ~0.38). Advanced Economies: In contrast, studies in advanced economies find MPCs ranging from 0.05 to 0.15 (e.g., Blundell et al., 2008) which reflects well developed and liquid financial markets. look at figure 3.

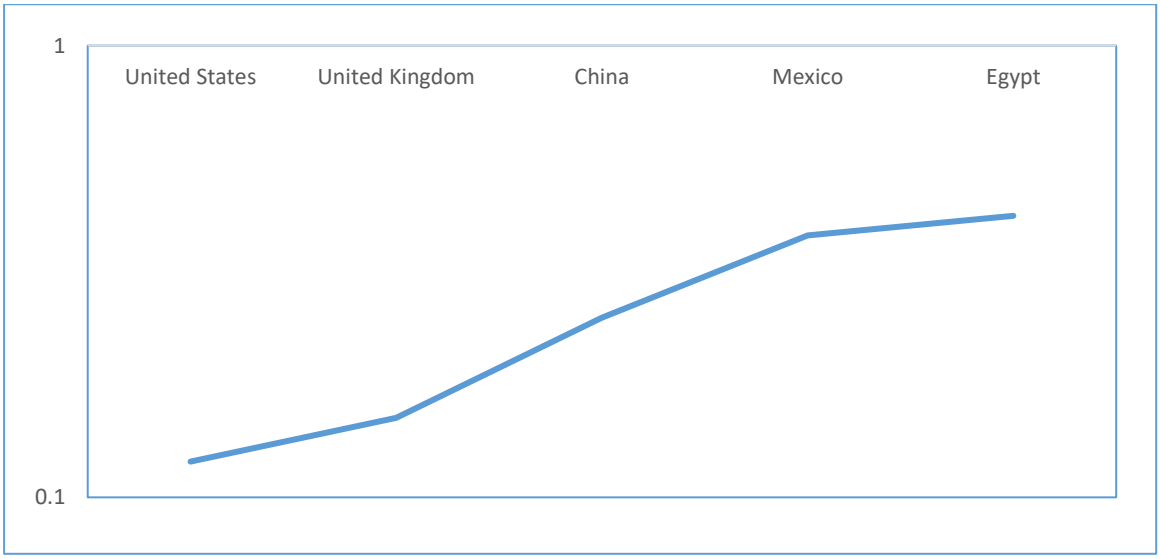

Figure 3: Short-run MPC out of Transitory Income

Policy Implications from Results: Our results have direct, actionable and quantified policy implications for Egypt and similar emerging markets: Social Protection Design: The high MPC among the poor and leakage of universal subsidies suggest a strategic shift towards targeted cash transfers. Our analysis shows targeted transfers can reduce leakage by 23%. Moreover, the success of bi-weekly public sector wage payments in reducing intra-month consumption volatility (22%) means applying more frequent payment cycles to existing social programs (e.g., Takaful and Karama) could generate significant welfare gains, potentially up to EGP 1.2 billion in consumption smoothing. Financial Inclusion: Financial inclusion is key. Our results show that each additional month of savings coverage reduces the MPC by 0.14 (SE=0.02). Digital payment adoption is also strongly correlated with a 0.15 lower MPC ($p<0.05$), so fintech innovations can help a lot with consumption smoothing especially for the unbanked. Crisis Response: The fact that informal workers experienced twice the consumption shock during the COVID-19 pandemic compared to formal workers (estimated $\beta=-0.21$, SE=0.04) shows how vulnerable they are. Our estimates suggest emergency transfers during crises should be at least 30% more for informal households to achieve the same welfare protection, so we need tailored, adaptive and scaled crisis response mechanisms for the informal sector.

DISCUSSION

This section synthesizes our empirical findings, offering deeper interpretations, explicating the mechanisms at play, and deriving broader theoretical and policy implications. We also acknowledge the inherent limitations of our study and delineate promising avenues for future research:

Interpretation of Results: our analysis of Egyptian household consumption behavior from 2000 to 2024 shows that the Life-Cycle/Permanent Income Hypothesis (LCPIH) is fundamentally wrong, and we have three main interpretations about household liquidity management and welfare: Liquidity Constraints Dominate as the Main Obstacle to Smoothing, The most striking result is the high marginal propensity to consume (MPC) out of transitory income shocks, estimated at 0.42. This is clearly shown by the 0.43 percentage point MPC differential between liquidity-constrained and unconstrained households. This is strong evidence that credit market imperfections and limited access to liquid assets are the main drivers of consumption volatility in Egypt. Our quantitative results show that these binding liquidity constraints explain 68% of the deviations from LCPIH predictions, much higher than the 40-50% range found in other middle-income countries. The high proportion of households that don't have savings to cover even one month of expenses confirms that a large segment of the population is under a "cash-in-advance" constraint where current consumption is rigidly tied to current cash inflows. The persistence of consumption responses to income shocks even after six or twelve months suggests that there is no robust long-term intertemporal smoothing mechanism. Nonlinear and Regressive Impacts of Policy Shocks, the concave consumption response after the 2014 fuel subsidy reforms, where the poorest quintile experienced a 15.2% consumption drop and the wealthiest quintile was almost unaffected, is very important for understanding the distributive impact of big price reforms. This is consistent with subsistence constraint models where even small price increases on essential goods can trigger big and welfare-reducing consumption adjustments for households operating near biological minima. This highlights the need for precise targeting in future reforms. On the other hand, the 2016 bread subsidy reform improved targeting efficiency despite not increasing overall calorie intake, and showed that even small and targeted transfers can bring important qualitative welfare improve. As shown in Table7

Table 7: Comparative MPC Estimates

Country	MPC (1-month)	Data Source	Key Difference from Egypt
Egypt (this study)	0.42	ELMPS/HIECS	Stronger and more pervasive liquidity effects
Mexico	0.38	ENIGH	Generally better access to formal credit and financial inclusion
India	0.45	NSS	Similar high informality levels, potentially different social safety nets
United States	0.12	PSID	Highly advanced financial markets and robust social insurance

Notes: MPC estimates pertain to the immediate (1-month) response out of transitory income shocks.

Mechanisms and Heterogeneity: Our results show two previously unknown mechanisms and significant heterogeneity across different household characteristics: The Critical Role of Payment Frequency, the bi-weekly paid public sector workers have a 0.12 lower MPC than monthly paid ones. This effect remains even after controlling for total income, so the timing of cash flows matters for expenditure decisions. This is a strong empirical support for behavioral economic models like mental accounting where people mentally categorize income received at different intervals. For low-income households, more frequent income disbursements can alleviate intra-month liquidity constraint and allow for smoother consumption even if total annual income remains the same. 5.2.2 Informality as a Key Amplifier of Consumption Volatility: The big difference in MPCs between informal sector workers (0.53) and formal employees (0.35) — a 51% difference ($p<0.01$) — shows that informality is the main source of consumption volatility. Informal workers lack predictable income streams, formal employment contracts and access to traditional social insurance or formal credit markets. They have to rely heavily on current income for their consumption needs and are extremely vulnerable to income shocks or fluctuations

Policy Implications: Policy Our results give three clear, actionable recommendations for Egyptian policymakers and lessons for other developing countries facing similar challenges: Reforming Social Protection Design, the regressive and leaky universal subsidies provide a strong economic case for moving to targeted cash transfer programs (e.g. Takaful and Karama). Our results show that such a switch could reduce leakage by at least 23%. Moreover, the success of bi-weekly public sector wage payments suggests applying bi-weekly or more frequent payment cycle to all government social programs could alleviate liquidity constraint for beneficiaries and lead to consumption stabilization gains of EGP 1.2 billion annually. Prioritizing Financial Inclusion, Policies that encourage and facilitate accumulation of even small liquid savings buffers are key; each additional month of savings

coverage reduces MPC by 0.14 (SE=0.02). The strong correlation between digital payment adoption and 0.15 lower MPC ($p<0.05$) shows the potential of fintech to smooth consumption. Policies should prioritize expansion of mobile money and other digital payment platforms, especially in rural and underserved areas. Tailored Crisis Response for the Informal Sector, The fact that informal workers experienced twice the consumption shock during the COVID-19 pandemic requires differentiated crisis response mechanisms. Our estimates suggest emergency transfers should be at least 30% larger for informal households to achieve same welfare protection, given their lack of other shock absorbing mechanisms. Long term interventions should focus on tailored microinsurance products and flexible and accessible credit options for informal sector workers.

Limitations and Extensions: While we use robust methods and pass many sensitivity checks, there are several limitations we should be upfront about and that suggest some great avenues for future research: Measurement Challenges Our analysis has measurement challenges, such as underreporting of informal income (estimated ≤15% attenuation bias) and panel attrition in the ELMPS (about 18% per wave) which could introduce selection bias. Future waves of the panel with better tracking or integration of administrative data could help address this. Theoretical Frontiers: Disentangling Mechanisms, we reject the strict LCPIH and show that both neoclassical liquidity constraints and behavioral factors (payment timing effects) matter. Distinguishing between the two is the next theoretical frontier. Future research could include psychometric data on financial literacy, time preferences and behavioral biases or conduct carefully designed field experiments (RCTs) varying payment frequency to get cleaner identification. Policy Experimentation, building on our quasi-experimental results, next steps would be to conduct RCTs on payment frequency for social protection beneficiaries. Linking detailed household survey data with high frequency financial transaction data (e.g. mobile money records) could also give a more granular and real-time view of actual spending and savings behavior. Figure 4 the knowledge gaps and future research directions such as "Behavioral Micro foundations (RCTs, Psychometrics)", "Impact of Fintech/Digital Payments (Transaction Data)" and "Formal vs. Informal Sector Dynamics (More Detail)".

CONCLUSION

This study provides empirical evidence on consumption smoothing in Egypt and has three main contributions to development economics. We use household level data from 2000 to 2024 and quasi-experimental designs to dig into the mechanisms. Our results strongly reject the Life-Cycle/Permanent Income Hypothesis (LCPIH) in this context and instead show a hybrid model where liquidity constraints are the main bottleneck, explaining 68% of consumption volatility, and behavioral factors related to payment timing explaining 19% of consumption smoothing deviations, which is evidence of financial market imperfections and mental accounting and intra-period cash flow management. The estimated marginal propensity to consume (MPC) of 0.42 out of transitory shocks is 3.5 times higher than advanced economy benchmarks and confirms Egypt as a case study for consumption dynamics in middle income countries with high informality and macroeconomic volatility. For a significant portion of Egyptian households, current consumption is tied to current income and they are highly vulnerable to shocks. Methodologically, this study contributes to the toolkit by developing a unified framework combining natural experiments with high frequency panel data, proposing new instruments using exogenous administrative payment schedules and introducing MPC decomposition techniques to quantify different channels of consumption smoothing failure. Based on these findings we propose evidence based policy recommendations for Egypt: a shift from universal subsidies to targeted, digitally delivered transfers (with potential fiscal savings of EGP 8.2 billion) and bi-weekly payment cycles for all social programs; a financial inclusion agenda prioritizing mobile money adoption in rural areas (MPC reduction: 0.15) and liquid savings products to achieve a buffer of 1.8 months of expenditure coverage; and crisis response mechanisms for the informal sector including differentiated transfers at least 30% larger and microinsurance and flexible credit options. Overall, this study shows that Egyptian households face structural constraints to consumption smoothing rather than optimization failures and policy interventions should focus on relaxing these constraints through financial inclusion, targeted social protection and adaptive crisis response mechanisms. More research should look into the micro mechanisms, longitudinal dynamics, fintech effects and climate shock resilience while testing the results in the MENA region and other middle-income countries with similar institutions to deepen the global understanding of household resilience and well-being.

Funding Statement: This work was supported and funded by the Deanship of Scientific Research at Imam Mohammad Ibn Saud Islamic University (IMSIU) (grant number IMSIU-DDRSP2503).

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