

# Asymmetric Effects of Monetary Policy

## Empirical Evidence from Jamaica Using the Consumption-Wealth Channel

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# Outline of Presentation

- Motivation
- Objectives of the paper
- A brief review of the literature
- Data and methodology
- Empirical results
- Main supporting conclusions
- Policy implications
- Recommendations for future work

# Motivation

- To successfully conduct monetary policy, policymakers must have an appreciation of the timing and effects of their policies on the economy.
- Changes in monetary policy are propagated throughout the economy via a transmission mechanism.
- This paper attempts to explore the pass through of monetary policy changes on consumption expenditure in Jamaica, by looking specifically on the consumption-wealth channel.

# Objectives

- Given the transmission mechanism and in light of the theoretical relationship that exists between interest rate and wealth and the effects of wealth changes on consumption expenditure, this study seeks to answer two questions:
  - Does the consumption-wealth channel work in Jamaica?
  - Can the consumption-wealth channel explain the asymmetric effects of interest rate changes in Jamaica?

# Review of Literature

- Commonly used estimation techniques include:
  - Two-stage ordinary least square (OLS).
  - Structural vector-autoregressive (VAR) methods using various measures of wealth.
- The dominant finding is that the consumption-wealth channel exists and plays a significant role in explaining the asymmetric effects of monetary policy changes.

# Review of Literature

- Mullineux et al (2011): used two-stage OLS with quarterly data from 1990 to 2006. They found that easy monetary policy was more effective in influencing consumption than tight monetary policy.
- Siokis (2005): used a SVAR using data on consumption, income, wealth, interest rate and inflation. Period: 1977 to 2002. Found that easy monetary policy was more effective in influencing consumption than tight monetary policy.
- Ludvigson et al (2002): used a VAR with two samples from 1966-1979 and 1979-2000. Found that the wealth channel played only a weak role in transmitting monetary policy changes to consumption spending.

# Data

- The empirical analysis was conducted using quarterly data from 1990 to 2011.
- The variables used are:
  - real consumption
  - real Gross Domestic Product (GDP)
  - inflation as measured by the change in the log of the consumer price index (CPI)
  - the 180-day Treasury bill rate
  - real disposable income proxied by real wages
  - the Jamaica Stock Exchange Index as a measure of wealth
  - the 30-day CD rate.

# Stability Properties of the Variables

- The orders of integration of the variables were determined by using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests for unit roots.
- In addition, the variables are cointegrated with one cointegrating vector as indicated by the Johansen test.



# Methodology

The methodology employed in this paper follows that of Mullineux et al (2011), Morgan (1993) and Mullineux et al (2009). As a result, we looked at three different estimations.

- Mullineux et al (2011) used a two-stage OLS procedure to estimate an interest rate, wealth and consumption equation.
- Morgan (1993) used two-stage OLS to estimate an interest rate and an output equation and uses the Boschen-Mill Index as an alternative measure of policy.
- Mullineux et al (2009) use a vector autoregressive model to analyse asymmetries in the consumption-wealth channel using data on consumption, income, wealth, interest rate and inflation.

# Mullineux et al (2011)

- In the first stage regression the interest rate equation is estimated as follows:

- $$r_t = \alpha_0 + \sum_{i=1}^N \alpha_i^r r_{t-i} + \sum_{i=1}^M \alpha_i^y y_{t-i} + \sum_{i=1}^R \alpha_i^\pi \pi_{t-i} + u_t \quad (1)$$

- where  $r_t$  represents the 180-day Treasury bill rate,  $y_t$  is real GDP,  $\pi_t$  is the inflation rate and  $u_t$  is the residual that denotes the interest rate shocks not explained by the explanatory variables.

# Mullineux et al (2011) Cont'

- The residuals from this first stage regression are collected and used to construct two distinct series of interest rate shock that is positive and negative shocks.
- The positive (easy) monetary shocks are represented by  $u_t^+ = \min(u_t, 0)$
- The negative (tight) monetary shocks are represented by  $u_t^- = \max(u_t, 0)$ .

# Mullineux et al (2011) Cont'

- The second stage regression is of the form:

- $w_t = \beta_0 + \sum_{i=1}^P \beta_i^y w_{t-i} + \sum_{i=1}^S (\gamma_i^+ u_{t-i}^+ + \gamma_i^- u_{t-i}^-) + v_t$  (2.0)

- $c_t = \beta_0 + \sum_{i=1}^P \beta_i^y c_{t-i} + \sum_{i=1}^S (\gamma_i^+ u_{t-i}^+ + \gamma_i^- u_{t-i}^-) + v_t$  (2.1)

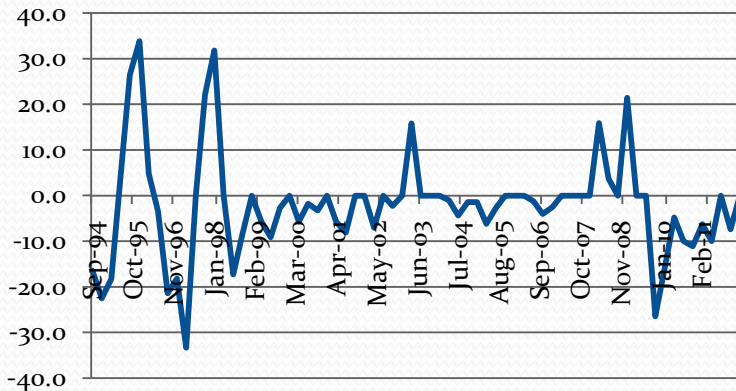
where  $w_t$  is wealth and  $c_t$  is consumption

# Morgan (1993)

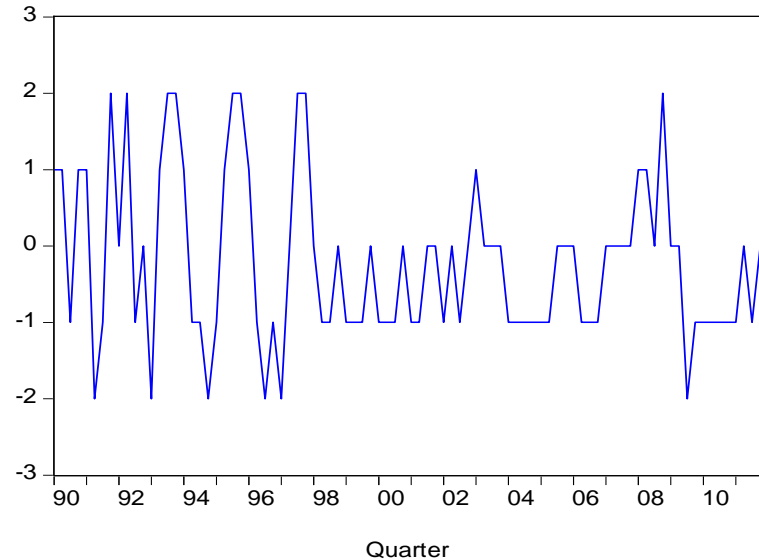
- The second estimation follows Morgan (1993).
- The Samuels-Serju monetary policy index
- The index is constructed using quarterly data from 1990 to 2011.
- Using the Bank of Jamaica 30-day certificate of deposit (CD) rate: monetary policy instrument.
- However, prior to 1994 only a few 30-day CD was issued and as such, movements in the 90-day CD rate was used as a proxy from 1990 to 1994.

# Samuels-Serju Monetary Policy Index

## 30-Day CD



## Samuels-Serju Index



% change in 30-day CD	Policy Stance	Index Value
$\geq 20$	Very Tight	2
$0 < 20$	Tight	1
0	Neutral	0
$\leq -20$	Very Easy	-2
$-20 < 0$	Easy	-1

# Mullineux et al (2009)

- The third estimation follows that of Mullineux et al (2009).
- Based on the Johansen test for cointegration, a cointegrating relationship exists among the variables, i.e. they share a long-run equilibrium relationship.
- Therefore, the paper uses a vector error correction model (VECM) to evaluate the importance of the role of the consumption-wealth channel in explaining asymmetric effects of monetary policy in Jamaica.
- The optimal number of lags used for each variable in the VECM was determined by the Hannan-Quinn information criterion.

# Mullineux et al (2009): Cont'

- The vector error correction model is of the form:

$$\Delta Y_t = \alpha Y_{t-1} + \sum_{i=1}^{k-1} \varphi_i \Delta Y_{t-i} + v_t$$

- where  $Y$  is a vector which contains all the stationary variables namely inflation, household net labour income, consumption, interest rates and wealth as measured by the JSE index.



# Mullineux et al (2009): Cont'

- The variables are ordered as follows:

*Inflation* → *Household Net Labour Income* → *Consumption* → *Wealth* → *Interest Rate*

- By this ordering, interest rate does not contemporaneously respond to changes in wealth and consumption is contemporaneously affected by wealth but not the reverse.

# Empirical Results

## Wealth Estimation: Two-Stage OLS Using Policy Rate

A one percentage point increase in interest rate is associated with a 1.6 percentage point reduction in wealth. However, a one percentage point reduction in interest rate is associated with a 1.4 percentage point increase in wealth.

Variables	Coefficients	p-value
Intercept	0.0460	0.0038
Growth rate of the JSE Index(-1)	0.4218	0.0023
Growth rate of the JSE Index(-4)	-0.1579	0.1882
Growth rate of the JSE Index(-5)	0.2525	0.1035
Growth rate of the JSE Index(-6)	0.1066	0.3547
Growth rate of the JSE Index(-7)	-0.0653	0.6403
<b>Easy policy(-1)</b>	<b>1.4155*</b>	<b>0.0919</b>
<b>Tight policy(-1)</b>	<b>-1.6078**</b>	<b>0.0235</b>
R-squared	0.3154	
Adjusted R-squared	0.2488	
Log likelihood	62.5733	
F-statistic	4.7388	
Prob(F-statistic)	0.0002	
Durbin-Watson Statistic	1.904	
Akaike info criterion	-1.3643	
Schwarz criterion	-1.1261	

# Empirical Results

## Consumption Estimation: Two-Stage OLS Using Policy Rate

A one percentage point reduction (increase) in interest rate is associated with a 0.4 (0.6) percentage point increase (decrease) in consumption.

Variables	Coefficients	p-value
Intercept	0.0205	0.0146
Consumption Growth(-1)	-0.4511	0.0001
Consumption Growth(-2)	-0.4061	0.0019
Consumption Growth(-3)	-0.1275	0.3694
Consumption Growth(-4)	-0.2071	0.1001
<b>Easy policy(-1)</b>	<b>0.3934**</b>	<b>0.03845</b>
<b>Tight policy(-1)</b>	<b>-0.6041**</b>	<b>0.0445</b>
R-squared	0.2864	
Adjusted R-squared	0.2300	
Log likelihood	133.3491	
F-statistic	5.0832	
Prob(F-statistic)	0.0002	
Durbin-Watson Statistic	1.9497	
Akaike info criterion	-3.0446	
Schwarz criterion	-2.8406	

# Empirical Results

## Consumption Estimation – Equality of Coefficients

The result indicates that the two coefficients are statistically different from each other, which suggest the presence of asymmetry in monetary policy.

The results suggest that monetary tightening has a greater impact than monetary easing on economic activity.

Test Statistic	Value	Degree of freedom	Probability
F-statistic	3.2719	(2, 76)	0.0433
Chi-square	6.5438	2	0.0379

# Empirical Results

## Wealth Estimation: Two-Stage OLS using the Samuels-Serju Index

Similar to the findings using the interest rate, increases in the index have a negative and significant impact on wealth.

However, reductions in the index, while positive, is not significant.

Variables	Coefficients	p-values
Intercept	0.0684***	0.0007
$\Delta$ JSE Index(-1)	0.3731***	0.0006
$\Delta$ JSE Index(-4)	-0.1524	0.1407
$\Delta$ JSE Index(-5)	0.2345	0.1002
$\Delta$ JSE Index(-6)	0.0583	0.4377
<b>Easy policy(-1)</b>	<b>0.0513</b>	<b>0.1632</b>
<b>Tight policy(-1)</b>	<b>-0.1260***</b>	<b>0.0032</b>
R-squared	0.391	
Adjusted R-squared	0.3416	
Log likelihood	68.1344	
F-statistic	7.9182	
Prob(F-statistic)	0.0000	
Durbin-Watson Statistic	1.8407	
Akaike info criterion	-1.5095	
Schwarz criterion	-1.3026	

# Empirical Results

## Consumption Estimation: Two-Stage OLS using the Samuels-Serju Index

The results are the same as that obtained from the interest rate estimation, whereby interest rate increases (decreases) have a negative (positive) and significant impact on consumption in Jamaica.

Variables	Coefficients	p-values
Intercept	0.0247***	0.0024
Consumption Growth(-1)	-0.4054***	0.0003
Consumption Growth(-2)	-0.3887***	0.0002
Consumption Growth(-4)	-0.2288**	0.0497
<b>Easy policy(-1)</b>	<b>0.0279***</b>	<b>0.0073</b>
<b>Tight policy(-1)</b>	<b>-0.0260***</b>	<b>0.0716</b>
R-squared	0.2825	
Adjusted R-squared	0.2359	
Log likelihood	133.1251	
F-statistic	6.0640	
Prob(F-statistic)	0.0001	
Durbin-Watson Statistic	2.0343	
Akaike info criterion	-3.0623	
Schwarz criterion	-2.8884	

## Empirical Results

### Consumption Estimation: Equality of Coefficients - Samuels-Serju Index

The test for equality of the two coefficients on the tight and easy policy variables in the consumption function using the index, also reveal that the two effects are statistically different from each other and suggests the presence of asymmetry.

Test Statistic	Value	Degrees of freedom	Probability
F-statistic	3.8174	(2, 77)	0.0263
Chi-square	7.6348	2	0.022

# Diagnostic Tests

The robustness of the results presented were ascertained by a series of diagnostic tests which include:

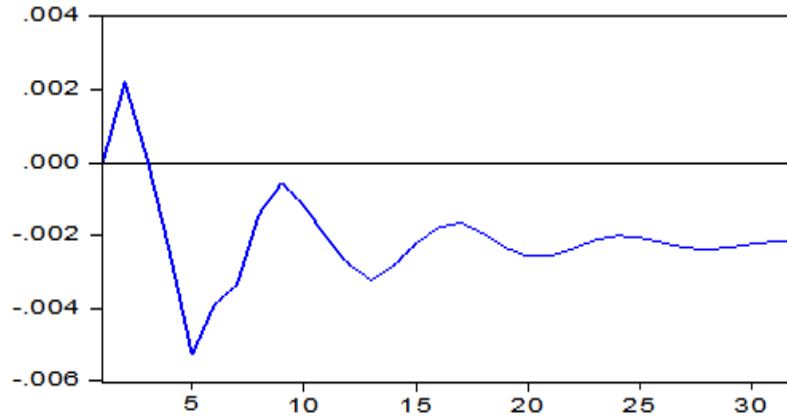
- Durbin-Watson test
- Jarque-Bera test
- ARCH LM test
- Breush- Pagan test



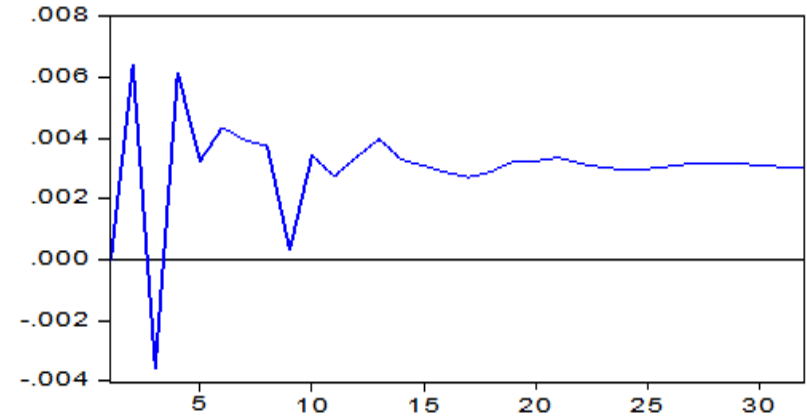
# Response to interest rate shocks

## Response to Cholesky One S.D. Innovations

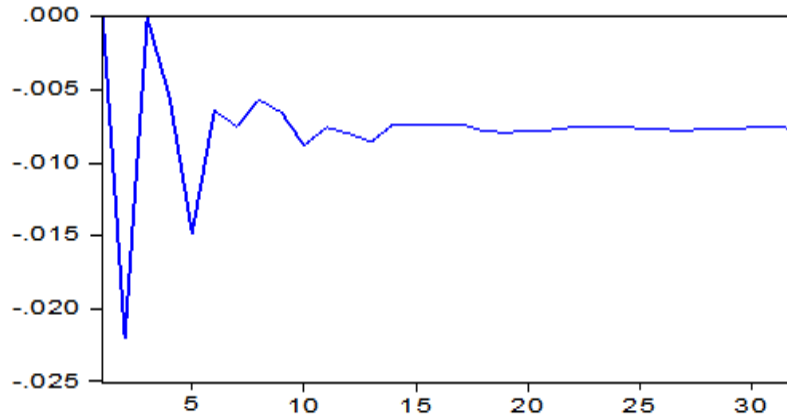
Response of DLCPIISA to DRATE



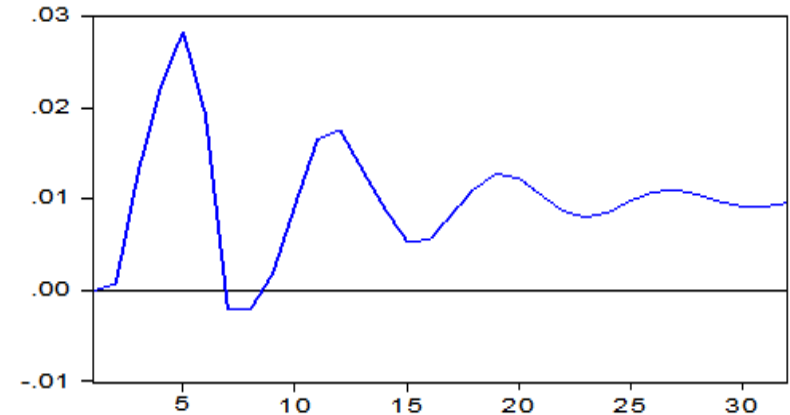
Response of DLWAGESA to DRATE



Response of DLCONSA to DRATE

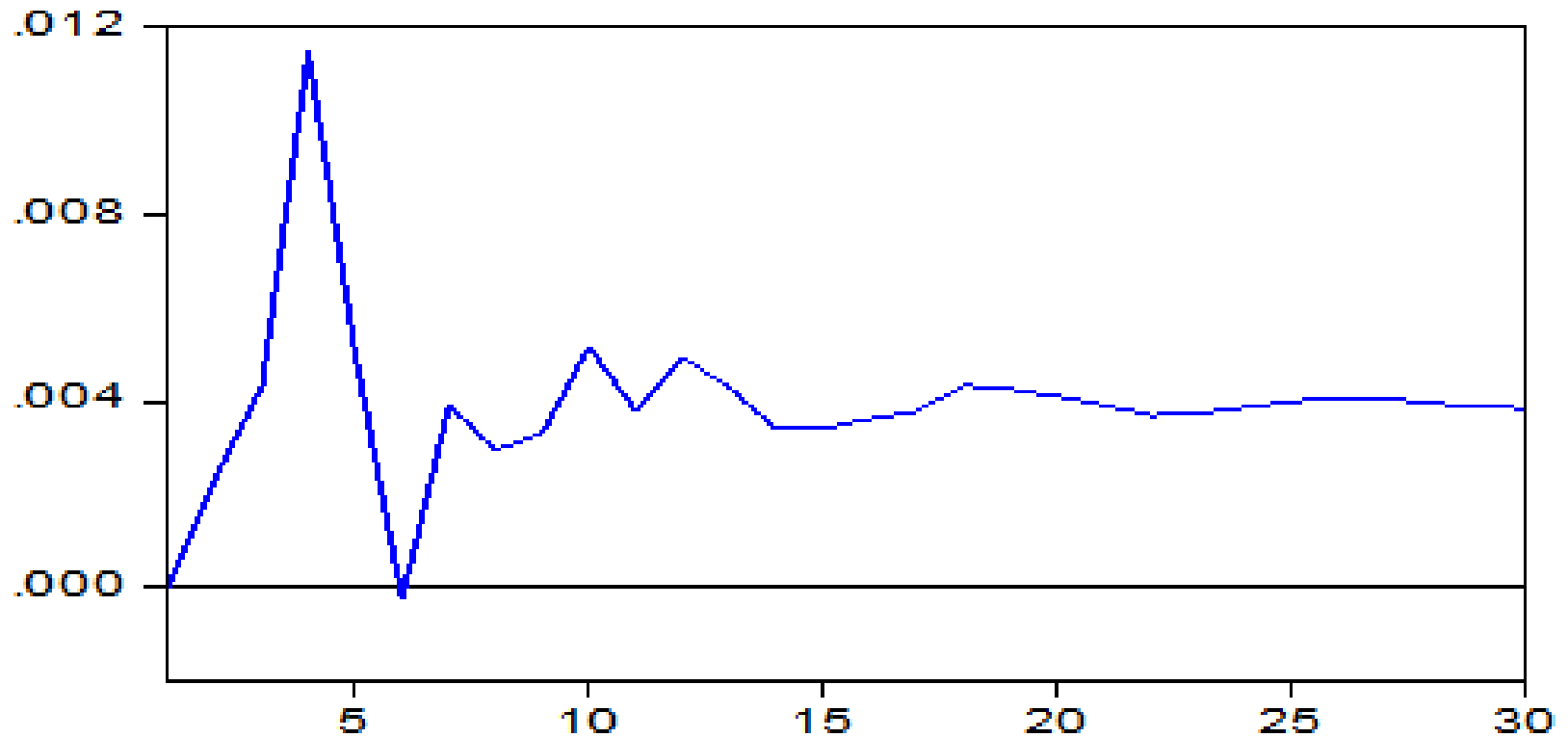


Response of DJSESA to DRATE



# Response of consumption to wealth shocks

## Response of DLCONSA to DJSESA



# Variance Decomposition of Consumption

Period	Standard Error	Inflation	Income	Consumption	JSE Index	Interest Rate
1	0.026529	2.578766	0.308674	97.11256	0.000000	0.000000
5	0.052122	2.015725	0.521866	92.47837	4.756230	0.227810
10	0.067245	1.726367	0.551781	92.44997	5.094178	0.177699
15	0.080673	1.496179	0.518337	92.25645	5.591206	0.137828
25	0.102457	1.253192	0.493845	92.24705	5.902103	0.103811
35	0.120241	1.132145	0.477786	92.23304	6.072869	0.084162

# Variance Decomposition of Wealth

Period	Standard Error	Inflation	Income	Consumption	JSE Index	Interest Rate
1	0.0265	1.2786	5.9988	0.8780	91.8446	0.0000
5	0.0521	4.5403	7.2815	3.2080	73.3273	11.6430
10	0.0672	3.1326	6.0014	2.4415	79.1838	9.2407
15	0.0807	2.4797	5.4176	2.0363	80.1603	9.9060
25	0.1025	1.6743	5.2276	1.7927	81.3744	9.9311
35	0.1202	1.3099	5.0486	1.6366	82.0345	9.9704

# Conclusions

- The consumption-wealth channel exists and it plays an important role in explaining the asymmetric effects of interest rate changes in Jamaica, part of which can be attributed to the role of wealth changes in determining consumption.
- Easy monetary policy does not have a proportional impact on the consumption patterns of Jamaicans as tight monetary policy.
- Specifically, interest rate increases contract the economy more than interest rate cuts stimulate the economy.
- Thus, it is credible to infer that consumption responds asymmetrically to variations in interest rates through wealth changes due to fact that there is sufficient evidence to suggest that tight monetary policy is more effective than easy monetary policy.

# Policy Implications

- The Bank of Jamaica in implementing monetary policy must be cognizant of the asymmetry in the consumption-wealth channel.
- In addition, monetary tightening could reign in consumption growth over the desired level, which makes it important to re-assess monetary policy measures.

# Future Work

- This paper shed some light on the importance of the consumption-wealth channel in explaining asymmetric effects of monetary policy changes in Jamaica. However, future studies can consider using:
  - different measures of financial wealth such as total household net worth
  - non-financial wealth typically housing, using data on house prices and private sector dwelling investment
  - a counterfactual experiment that shuts down the wealth channel.

