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Getting high on the market: Stock price movements, drug abuse, and health implications

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ABSTRACT

Using an international dataset, this letter finds that high stock returns are associated with increased death rates from drug use disorders. Although the out-of-pocket expenditure on healthcare also rises following a stock market surge, the net effect on life expectancy is significantly negative.

KEYWORDS

Health Behaviors; Life Expectancy; Stock Market

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1. Introduction

Over the last couple of years, several thought-provoking pieces of evidence have emerged linking stock price fluctuations to the psychological health of investors and the broader society alike. The stress and anguish triggered by stock market downturns was shown to undermine the self-reported mental wellbeing (Cotti et al., 2015; Ratcliffe and Taylor, 2015), which resulted in increased admissions to psychiatric wards (Lin et al., 2015; Engleberg and Parsons 2016), upturns in suicide cases (Wisniewski et al., 2020) and treatment for depression (McInerney et al., 2013). Furthermore, the strong emotional responses evoked by stock losses appear to contribute to fatal car accidents (Giulietti et al., 2020), as well as precipitate smoking and binge drinking that are possibly used as stress-coping mechanisms (Cotti et al., 2015).

The literature on the association between the physical health and market gyrations is scant but worth recounting here. Schwandt (2018) finds that rising stock prices help to alleviate hypertension problems amongst elderly retirees and, to a limited degree, may reduce heart disease. Frijters et al. (2015) demonstrate that strong stock market performance significantly increases health satisfaction in Australian men but not in women. These initial findings, however, need to be interpreted with great caution, as they do not cohere with a bulk of evidence connecting economic circumstances to health status. Ruhm (2003) argued that economic slowdowns tend to improve adult health by promoting healthier lifestyles. Additionally, Cutler et al. (2011) review the literature and conclude that income does not have significant causal effect on adult health and that the causality appears to run in the opposite direction.

Our paper contributes to the debate by showing that, through income augmentation, bullish markets can increase mortality amongst those predisposed to drug abuse. Even though Cotti et al. (2015) suggested that the connection between stock market gains and illicit drug use is worthy of investigation, scholars remain silent on this issue. Our finding suggests that drugs should be viewed as hedonic items with a positive income elasticity, rather than vehicles to release tension during stock market slumps.

Our second contribution is to document that behavioral responses are triggered by largely unpredictable gains. Arkes et al. (1994) observe a higher marginal propensity to consume windfall gains as compared to other forms of income. This tendency violates the economic fungibility assumption that rational agents make no distinction between income sources when making spending decisions. Such puzzling behavior can be conceptualized within the framework of 'mental accounting' introduced by Kahneman and Tversky (1984). According to this theoretical proposition, individuals tend to mentally categorize their income into separate accounts to which they assign differing tendencies to spend. The assignation of income into a particular account may depend on its source (see Antonides and Ranyard (2017) for a literature review).

Furthermore, Levav and McGraw (2009) argue that not all windfalls are perceived equally due to the influence of emotions. Individuals attach "affective tags" to the income received that seem to determine how this income is spent. For instance, the tendency to purchase hedonic items is greater for a cash gift (favorable event) than for an inheritance (adverse event). Since stock market gains could be viewed as a pleasant surprise, a relatively large portion of it could be directed towards hedonic pursuits, such as procuring addictive substances.

In addition to these basic findings, we examine the impact of changing equity valuations on the out-of-pocket expenditure on healthcare and on life expectancy. These relationships have hitherto not been examined empirically. Our dataset comprises a large number of countries, allowing us to derive conclusions that are generalizable to a global context.

2. Data and Methodology

We use country-level data from two sources, namely the *World Development Indicators* and *Our World in Data.*

Data availability defines the sample period ranging from 1990 to 2017 and spanning 74 countries (75 in life expectancy regression). As observations on some country-years are missing, our panel data is unbalanced. Tables 1 and II detail variables employed in the study along with the corresponding summary statistics. According to the Maddala and Wu (1999) panel unit root test, all variables are stationary.

In our regressions we introduce the standard macroeconomic controls together with a variable gauging the size of the stock market. Additionally, we investigate measures that account for how isolated living may contribute to the deaths by looking at population density and the proportion of people living in rural areas. Dew *et al.* (2007) make reference to the fact that features of non-urban living can contribute to drug use through a dearth of recreational options, fewer economic opportunities, and a lower propensity of communities to acknowledge the severity of substance abuse. These conditions may lead to individuals being forced to rely on themselves rather than resolve their issues with support.

Our modeling utilizes a fixed effect panel approach, which controls for time-invariant heterogeneity across countries and is relatively robust to omitted variable bias. Results of Hausman (1978) specification tests reveal that residuals from a random effect model are correlated with explanatory variables for all specifications, indicating that the fixed effect approach is the preferred modeling alternative. The null hypothesis that fixed effects are jointly insignificant is also strongly rejected for all specifications. Both contemporaneous and lagged stock returns are included as regressors to account for the dynamic nature of the relationships.

For each of the dependent variables listed in Table 1, we run two different variants of regressions. The first modelling approach consists of fixed effect panel models with heteroskedasticity-consistent standard errors. In the second set of regressions, we perform a population-weighted estimation. The weight of a particular observation is calculated as the population in that country-year scaled by the total population in all sample countries for that year. Population data has been downloaded from World Development Indicators.

Table 1. Variable Definitions and Data Sources.

Panel A. Dependent Variables		
Variable	Definition	Source
Drug_Deaths	Age-standardized rate of deaths due to drug use disorders for both sexes (deaths per 100,000 individuals)	Our World in Data
OPHealthEx	Out-of-pocket health expenditure (% of current health expenditure)	World Development Indicators
Lifespan	Life expectancy at birth, total (years)	World Development Indicators
Panel B. Explanatory Variables		
Variable	Definition	Source
Return	Annual return on national S&P Global Equity Indices	World Development Indicators
Return_Lagged	Lagged Return variable	World Development Indicators
GDP_Growth	GDP growth (annual %)	World Development Indicators
Inflation	Inflation, consumer prices (annual %)	World Development Indicators
Unemployment	Modeled ILO estimate of total unemployment (% of total labor force)	World Development Indicators
Rural	Rural population (% of total population)	World Development Indicators
Density	Population density (people per square km of land area)	World Development Indicators
Capitalization	Market capitalization of listed domestic companies (% of GDP)	World Development Indicators
Trend	Time trend (1990=1)	

Table 2. Summary Statistics.

	No. obs.	Mean	Standard Deviation	25th Percentile	Median	75th Percentile	Maddala and Wu (1999) Unit Root Test	Maddala and Wu (1999) Test p-value
Drug_Deaths	2,268	1.6980	1.6281	0.6788	1.1652	2.1945	205.3116	0.0091
OPHealthEx	1,366	29.9533	16.9962	15.4038	26.6822	41.0766	233.9333	0.0001
Lifespan	2,296	72.8988	7.5839	70.3903	74.4548	77.9232	451.8796	0.0000
Return	1,756	10.0726	35.7631	-12.0317	7.6240	28.5733	732.8168	0.0000
GDP_Growth	2,246	3.5174	4.1824	1.6266	3.5648	5.6367	599.9118	0.0000
Inflation	2,158	22.7557	223.0381	1.8002	3.4629	7.5959	2188.0854	0.0000
Unemployment	2,214	7.7768	5.2386	3.9733	6.7105	10.1000	296.9486	0.0000
Rural	2,296	33.4031	19.7794	18.5165	30.7665	46.0720	225.6806	0.0000
Density	2,273	301.7650	994.4498	33.7663	86.1513	201.5279	387.3808	0.0000
Capitalization	1,551	68.1955	106.0787	20.8875	41.2641	82.4384	264.2691	0.0000

Notes: Exact variable definitions are given in Table 1. The last two columns in the table present results of a panel unit root test developed by Maddala and Wu (1999). The test statistic is calculated by combining the p-values from individual ADF tests conducted in each cross-sectional unit. Individual intercepts and time trends are assumed, and lag length is determined using the Schwarz information criterion.

3. Results

Models (1) and (4) reported in Table 3 reveal that drug-related premature deaths increase in response to growing stock market indices. In a related study, Dobkin and Puller (2007) report that government transfers induce monthly cycles in drug-related hospital admissions, with admissions escalating immediately after the payment. Similarly, an experimental study by Petry (2000) documents how heroin and cocaine users would choose to spend more money on drugs if their incomes were to increase. Our results refine the idea of drug income elasticity by identifying capital gains as a contributory factor to deaths directly attributable to drug use disorders. It appears that stock market profits promote expenditure on illicit substances. However, one needs to realize that a bullish stock market not only fattens the purse of an investor but also heralds future macroeconomic upswings. Such prosperity may lead to changes in labor market demands, thereby modifying the inclinations to indulge in addictive behaviors. As a result, the relationship between drug addiction and returns could establish itself through a channel other than the income effect. Nevertheless, such an interpretation is undermined by the fact that our models explicitly control for the unemployment rate.

Our remaining regressions may suggest that the afflictions caused by the gain-induced drug abuse force individuals to seek self-financed medical treatments and therapies, however, this does not entirely eliminate the negative impacts of the intensified addiction on lifespan. Such findings, seem to echo the message conveyed by Ruhm (2003) who argued that economic excesses have deleterious health effects.

Table 3. Fixed Effect Panel Regression Results.

	Unweighted Regressions			Population-Weighted Regressions		
	Dependent Variable					
	Drug_Deaths	OPHealthEx	Lifespan	Drug_Deaths	OPHealthEx	Lifespan
	(1)	(2)	(3)	(4)	(5)	(6)
Return	0.0016****	0.0030	-0.0024***	0.0033**	0.0308**	-0.0053**
	(0.0005)	(0.0047)	(0.0007)	(0.0015)	(0.0146)	(0.0022)
Return_Lagged	0.0006	0.0073*	-0.0014*	0.0029**	0.0248*	-0.0042***
	(0.0005)	(0.0041)	(0.0008)	(0.0011)	(0.0139)	(0.0016)
GDP_Growth	0.0113*	0.1148**	-0.0066	-0.0582**	-0.0765	-0.0289
	(0.0067)	(0.0523)	(0.0111)	(0.0238)	(0.1729)	(0.0300)
Inflation	0.0038	0.0721**	-0.0128**	-0.0011	-0.2605*	0.0055
	(0.0024)	(0.0347)	(0.0058)	(0.0126)	(0.1507)	(0.0149)
Unemployment	0.0234**	0.2063***	0.0042	0.0725	-0.3329	0.2542***
	(0.0114)	(0.0527)	(0.0102)	(0.1147)	(0.2420)	(0.0697)
Rural	0.0471***	0.7249***	-0.0969***	0.1818***	1.4377***	0.1925***
	(0.0107)	(0.1096)	(0.0175)	(0.0367)	(0.1224)	(0.0231)
Density	-0.0001	-0.0101***	0.0006***	-0.0357***	-0.0097	0.0619***
	(0.0001)	(0.0011)	(0.0001)	(0.0076)	(0.0208)	(0.0056)
Capitalization	-0.0060***	-0.0057	0.0006*	-0.0002	-0.0332*	0.0068***
	(0.0016)	(0.0056)	(0.0003)	(0.0016)	(0.0177)	(0.0022)
Trend	0.0429***	0.1472***	0.2231***	0.3109***	0.0773	0.1617***
	(0.0086)	(0.0447)	(0.0047)	(0.0596)	(0.1149)	(0.0316)
No. of observations	1211	915	1238	1211	915	1238
Adjusted R-squared	72.6522%	95.9839%	98.5355%	85.1007%	99.8025%	99.9863%
F-stat (regression)	40.2011	267.3926	1003.7856	85.2828	5632.2406	109140.2376
Prob(F-stat)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hausman test	35.3774	76.9557	63.3046	512.6396	259.4502	3795.2222
Prob(Hausman test)	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000
F-stat (fixed effects)	36.9882	179.7904	511.5815	37.4078	47.2900	2224.9068
Prob(F-stat)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

*Notes: This table presents fixed effect panel regressions with Drug_Deaths, OPHealthEx, and Lifespan acting as dependent variables. Models (1) to (3) have been estimated using an unweighted approach, while regressions (4) to (6) are population weighted. To conserve space, the fixed effects are not reported. Parameter standard errors estimated using the White (diagonal) method that is robust to observation-specific heteroskedasticity are given in parentheses. Variable definitions can be found in Table 1. The F-stat (regression) corresponds to the null hypothesis that the explanatory variables (including the fixed effects) are jointly statistically insignificant. The row labeled 'Hausman test' reports the chi-square test statistics based on Hausman (1978), which tests the null hypothesis that residuals from the random effect model are uncorrelated with the regressors. The last test reported in the table is for the hypothesis that fixed effects have no joint explanatory power. ***, **, * denote statistical significance at 1%, 5%, and 10%, respectively.*

4. Conclusions

We show that increases in stock market indices are associated with elevated mortality arising from drug abuse. Capital gains relax budgetary constraints and afford individuals more freedom to engage in addictive behaviors involving illicit substances. Even if such actions induce short-term pleasure, they have long-lasting and deleterious effects on health status. Individuals try to counter these adverse outcomes by reactively increasing their spending on healthcare, but their life expectancy is nonetheless inescapably diminished.

We have undertaken an analysis using country-level aggregates, as individual-level analysis is challenging to implement in this context. Data protection regulations prevent merging patient records with stock brokerage account information. Furthermore, we do not have a detailed breakdown of the out-of-pocked health expenditure data, which forestalls any detailed investigation of private spending on drug addiction treatments. Similarly,

household stock market participation data is unavailable for such a large number of countries over a long period, which forces us to use a capitalization-based proxy for the importance of the stock market.

Several practical implications arise. First, the finding that addictive tendencies are responsive to transitory income has important ramifications for policymakers, as it legitimizes monetary fines for possession of illicit drugs. Second, our conclusions are instructive for financial institutions that pay performance-based bonuses to their traders. The creation of drug-free workplace programs and the provision of anonymous addiction counseling services are recommended. Third, health professionals can glean some additional insight, as windfall gains have been identified as a possible trigger for substance abuse. Fourth, the rational addiction theory (Becker and Murphy, 1988) postulates that a substantial adverse effect on earnings lowers the income elasticity of consumption for addictive substances. Unsurprisingly, information campaigns highlighting addiction's health hazards have effectively moderated this income elasticity (Huang et al., 2014). Our results suggest that anti-drug campaign efforts should be intensified and also target society's higher-income stratum.

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Conflict of interest

All the authors claim that the manuscript is completely original. The authors also declare no conflict of interest.

References

Antonides, G. and Ranyard, R. (2017). Mental Accounting and Economic Behaviour, in Economic Psychology. *Chichester, UK: John Wiley & Sons*, pp.123–138. https://doi.org/10.1002/9781118926352.ch8

Arkes, HR., Joyner, C.A., , Pezzo, M.V., , Gradwohl, N.J., Siegel-Jacobs K., , Stone, E. (1994).The Psychology of Windfall Gains. *Organizational Behavior and Human Decision Processes*, *59*(3), pp.331-347. https://doi.org/10.1006/obhd.1994.1063

Becker, G.S. and Murphy, K.M. (1988). A theory of rational addiction. *Journal of Political Economy*, *96*(4), pp.675-700. https://doi.org/10.1086/261558

Cotti, C., Dunn, R.A. and Tefft, N. (2015). The Dow is killing me: Risky health behaviors and the stock market. *Health Economics*, *24*(7), pp.803-821. https://doi.org/10.1002/hec.3062

Cutler, D., Lleras-Muney, A. and Vogl, T. (2011). Socioeconomic status and health: Dimensions and mechanisms. In *The Oxford Handbook of Health Economics*, edited by Glied, S. and Smith P.C., pp. 124-163. https://doi.org/10.3386/w14333

Dew, B., Elifson, K. and Dozier, M. (2007). Social and environmental factors and their influence on drug use vulnerability and resiliency in rural populations. *The Journal of Rural Health 23,* pp.16-21. https://doi.org/10.1111/j.1748-0361.2007.00119.x

Dobkin, C. and Puller, S.L., (2007). The effects of government transfers on monthly cycles in drug abuse, hospitalization and mortality. *Journal of Public Economics*, *91*(11-12), pp.2137-2157. https://doi.org/10.1016/j.jpubeco.2007.04.007

Engelberg, J. and Parsons, C.A. (2016). Worrying about the stock market: Evidence from hospital admissions. *Journal of Finance*, *71*(3), pp.1227-1250. https://doi.org/10.1111/jofi.12386

Frijters, P., Johnston, D.W., Shields, M.A. and Sinha, K. (2015). A lifecycle perspective of stock market performance and wellbeing. *Journal of Economic Behavior & Organization*, *112*, pp.237-250. https://doi.org/10.1016/j.jebo.2015.02.004

Giulietti, C., Tonin, M. and Vlassopoulos, M. (2020). When the market drives you crazy: Stock market returns and

fatal car accidents. *Journal of Health Economics*, *70*, p.102245. https://doi.org/10.1016/j.jhealeco.2019.102245

Hausman, J.A. (1978). Specification tests in econometrics. *Econometrica, 46*(6), pp.1251-1271. https://doi.org/10.2307/1913827

Huang, B.N., Yang, C.W. and Hwang, M.J. (2004). New evidence on demand for cigarettes: A panel data approach. *International Journal of Applied Economics*, *1*(1), pp.81-97

Kahneman, D., & Tversky, A. (1984). Choices, values, and frames. *American Psychologist*, *39*(4), pp.341–350. https://doi.org/10.1037/0003-066X.39.4.341

Levav, J. and McGraw, A.P. (2009). Emotional accounting: How feelings about money influence consumer choice. *Journal of Marketing Research*, *46*(1), pp.66-80. https://doi.org/10.1509/jmkr.46.1.66

Lin, C.L., Chen, C.S. and Liu, T.C. (2015). Do stock prices drive people crazy?. *Health Policy and Planning*, *30*(2), pp.206-214. https://doi.org/10.1093/heapol/czu007

Maddala, G.S. and Wu, S. (1999). A comparative study of unit root tests with panel data and a new simple test. *Oxford Bulletin of Economics and Statistics*, *61*(S1), pp.631-652. https://doi.org/10.1111/1468-0084.0610s1631

McInerney, M., Mellor, J.M. and Nicholas, L.H. (2013). Recession depression: Mental health effects of the 2008 stock market crash. *Journal of Health Economics*, *32*(6), pp.1090-1104. https://doi.org/10.1016/j.jhealeco.2013.09.002

Petry, N.M. (2000). Effects of increasing income on polydrug use: a comparison of heroin, cocaine and alcohol abusers. *Addiction*, *95*(5), pp.705-717. https://doi.org/10.1046/j.1360-0443.2000.9557056.x

Ratcliffe, A. and Taylor, K. (2015). Who cares about stock market booms and busts? Evidence from data on mental health. *Oxford Economic Papers*, *67*(3), pp.826-845. https://doi.org/10.1093/oep/gpv030

Ruhm, C.J. (2003). Good times make you sick. *Journal of Health Economics*, *22*(4), pp.637-658. https://doi.org/10.1016/S0167-6296(03)00041-9

Schwandt, H. (2018). Wealth shocks and health outcomes: Evidence from stock market fluctuations. *American Economic Journal: Applied Economics*, *10*(4), pp.349-77. https://doi.org/10.1257/app.20140499

Wisniewski, T.P., Lambe, B.J. and Shrestha, K. (2020). Do Stock market fluctuations affect suicide rates? *Journal of Financial Research*, *43*(4), pp.737-765. https://doi.org/10.1111/jfir.12224