



Debt's moral hazard: ethical considerations for biopharmaceutical finance

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Moral hazard is inherent to debt, but this relationship is often overlooked in corporate finance. Although moral hazard can incentivise risk taking for social functioning (Claassen, 2015), it remains unethical overall: arising from unsustainable financial leverage that harms stakeholders in the short-run and renders the economy inefficient in the long-run.

Taking Krugman's (2009, p.63) definition that moral hazard is "any situation in which one person makes the decision about how much risk to take, while someone else bears the cost if things go badly", this essay will explore moral hazards where managers can lever capital to improve financial performance, while realising the cost of failure on other stakeholders and the economy. To avoid narrative bias when analysing such a situational subject, this essay will utilize empirical research conducted on highly leveraged firms chronically unable to cover interest expenses (coined 'zombie' firms by Caballero et al. (2008)) as foundation for a broader framework for the relationship between debt and moral hazard derived at the macro-level from Taleb (2012), and the micro-level from Acharya and Viswanathan (2011).

Contextually, the COVID-19 pandemic has emphasised the importance of healthcare development; this essay hopes to contribute its theory to further ethical financial management in global drug development. Conditions for the creation of zombie firms in the biopharmaceutical industry will be examined as an indicator of moral hazard, and case studies of highly leveraged biopharmaceutical firms will be used to study how risk is passed on. Finally, this essay will conclude with potential solutions to encourage more ethical financing decisions.

Congestion, Fragility and Asset Price Shocks

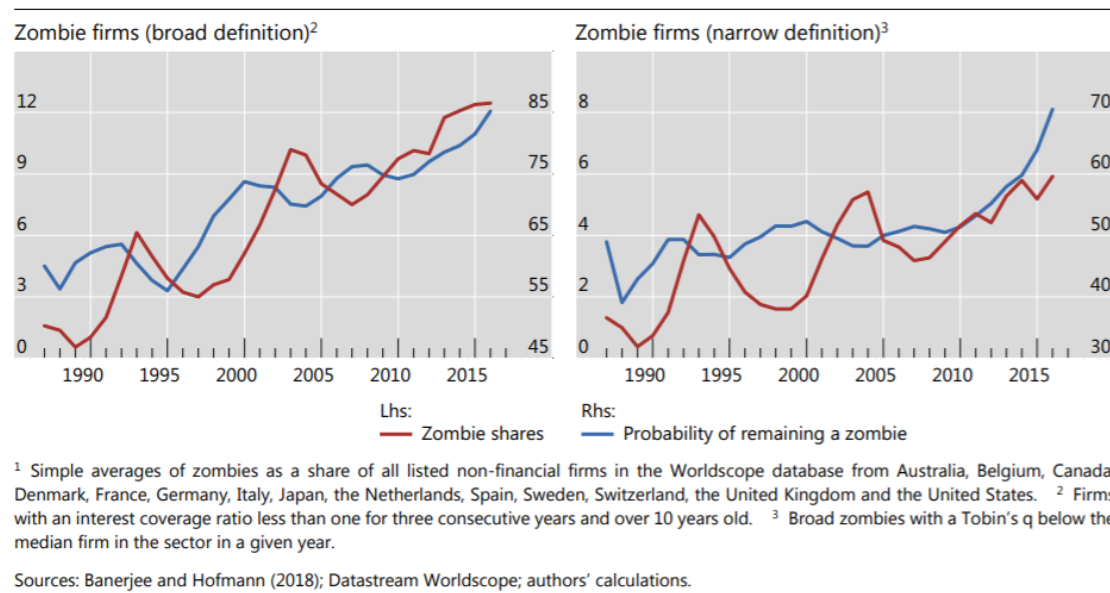
Existing theories of capital structure allocation encourage the use of leverage to maximise firm value without evaluating its ethical implications. For instance, the Modigliani-Miller propositions recommended using interest payments as income tax shields for "savings up to 50 cents per dollar of debt", which the proposers believed outweigh the increased bankruptcy risk of a high leverage strategy (Miller, 1988, pp.112-113). However, the contemporary theories discussed below argue that leverage can also shift risks to non-managerial stakeholders at a micro-level, and the economy at a macro-level. Hence, it is ethically important for managers to also assess the potential for moral hazard before taking on debt, though evaluating external risks present natural difficulties.

Moral hazards are often encouraged as a trade-off in government policy implemented to address more tangible costs. Recent expansionary interventions by the US Federal Reserve following the coronavirus pandemic enabled a swift rebound in the stock market, and dampened the effects of mass unemployment (Mackenzie, 2020). Yet critics such as Tepper (2020) revive the post-2008 warning towards bailing out failing firms. Tepper argues that the Federal Reserve has encouraged systemic moral hazard, suggesting that large portions of the US economy are now zombified. Indeed, the proportion of zombie firms increased nearly 6 times in developed economies over the last thirty years, and zombie firms are roughly 20% more likely to remain in business (Figure 1).

¹ This essay benefitted from comments by Lily Pitcher, undergraduate student at the University of Warwick.



Figure 1: Overall change in zombie firms across developed economies (Banerjee and Hofmann, 2018).



The issue with zombie firms is that they embody moral hazard. Caballero et al. (2008) suggest not only are zombie firms taking on more risks to rectify their poor financial position, but they also induce negative externalities for non-zombie firms. For instance, zombie firms create negative congestion effects in the crowding out of labour and growth from non-zombie firms: Banerjee and Hofmann (2018) estimate that a 1 percentage point increase in zombie firms translates to a 17% decrease in capital expenditure, and 8% decrease in employment growth, of non-zombie firms within the same sector. Hallak et al. (2018) explain that zombie firms act as sunk capital, forcing banks to lend at higher rates to non-zombie firms and compete for labour – particularly stunting the growth of young non-zombie firms. Hence, non-zombie firms bear the cost of unproductive borrowing by zombie firms.

General consensus suggests that weak bank health and low interest rates create zombie firms (Hallak et al., 2018). Caballero et al. (2008) proposed that when banks are insufficiently capitalised, they are more likely to be lenient with borrowers and roll over failing loans than realise losses. Rollovers extend the time for principal payments, enabling zombie firms to continue loss making operations without filing for bankruptcy. Today's low interest rates further reduce interest expenses for firms, which not only reduces financial pressure for zombie firms, but also incentives managers to take on more, cheaper debt – acting to promote zombie growth (Banerjee and Hofmann, 2018).

Therefore, zombie firms are the products of flawed financial environments within sectors and economies, though the relationship is a vicious circle. Taleb (2012) warns of moral hazard at a macro-level: debts leave little room for overconfidence in forecasting future income due to repayments, making them vulnerable to unpredictable and disruptive events that foil forecasts. When such an event triggers an economic downturn as a result, stimulus packages rescue overconfident managers, which further overconfidence bias at the expense of taxpayers. In particular, Taleb notes the financial fragility of policy-induced debt financing in lowering capital reserves and increasing interdependence between organisations such that, when one organisation fails, leads to an increase in likelihood of more organisations failing. This increases economic inefficiency by worsening busts in the business cycle. Zombie firms, then, are the epitome of Taleb's overconfident firms, and create interdependence in their reliance on rollovers; both arising from and contributing to financial fragility, though ultimately shifting the cost of failure on the economy.



Yet many argue for an increase in short-term rollovers to reduce moral hazard. Acharya and Viswanathan (2011) reiterate previous studies that financial crises result in a low liquidity environment where firms attempt to de-lever, forcing assets to be sold at deep discounts. This realises the loss of managerial risk taking on creditors and shareholders in negative asset price shocks: where asset values realised are below book values reported in company accounts. Acharya and Viswanathan argue that if banks can be convinced to rollover short-term debt during crises, liquidity will increase and reduce price shocks. While this approach appears sensible, their proof assumes rational managerial decision making and strong bank health to prevent short-term rollovers becoming long-term, both of which are weakened by the existence of zombie firms. Nonetheless, negative asset price shocks remain micro-level moral hazards for all bankruptcies to an extent, due to the difficulty in determining ex ante valuations. This problem is particularly relevant to highly leveraged firms – especially zombie firms – since they incur a higher risk of liquidation.

To summarise, it has been established that zombie firms are highly leveraged firms in operation unable to generate enough income to cover interest; they rely on rollovers or other financial assistance. Formed under favourable financial environments, managers of zombie firms are able to transfer risk onto other stakeholders, non-zombie firms and the general economy through negative asset price shocks, congestion effects and increased financial fragility. To ground these concepts in a real-world scenario, this essay will now undertake an analysis of the biopharmaceutical industry using the presence of zombie firms as an indicator of moral hazard potential within the life sciences sector.

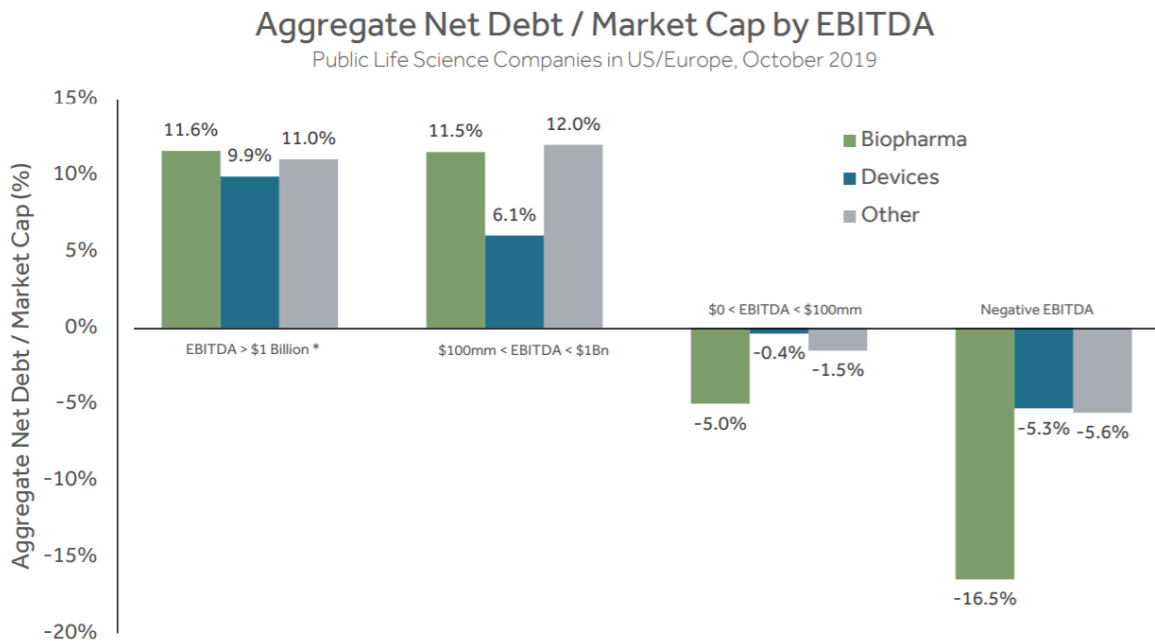
Biopharmaceutical Debt Dynamics

This essay will model biopharmaceutical finance in two stages: early-stage when a firm is developing its first drugs, and late-stage after a drug has been approved for commercialisation. Various forms of equity finance remain the dominant form of finance for both early-stage and late-stage development in the biopharmaceutical industry (de Crescenzo, 2019; McKinsey & Company, 2019), though funds raised in debt capital markets have grown 80% since 2017 (Baker McKenzie, 2020a), which is restricted from early-stage firms. Early-stage biopharmaceutical firms do not generate revenue, incurring significant risks in cash flow during the long development period: the cost of developing a marketable drug is an estimated \$1.8 billion¹, taking around 14 years and incurring high failure rates (Paul et al., 2010). Hence, banks rarely grant early-stage biopharmaceutical firms access to the debt capital market, as they lack a reliable income to service their debt.

While debt levels do increase with earnings in the biopharmaceutical industry on average (Figure 2), the dynamics of debt in the life sciences sector differ between bank and non-bank lending, yielding an addition to the causes of zombification. Torrey (2019) finds that total direct private debt in the life sciences sector has risen 52.6% from 2014 to 2018, and Dorin and Vojtko (2018) cite laxer alternative lending regulations compared to banking regulations as a reason for increased direct lending activity. The sector's shift to direct lending is not inherently concerning, and the relationship between zombie firms and direct lending has not been formally established as with bank lending. However, private lenders are increasing credit access so nearly 1/3 of the loans go to early-stage life sciences firms (Torrey, 2019). Since early-stage firms do not generate revenue, they essentially zombify themselves until enough income is generated to service their debt.

² All dollar values in USD.

Figure 2: Overall trend between biopharmaceutical leverage and earnings (Torreya, 2019).

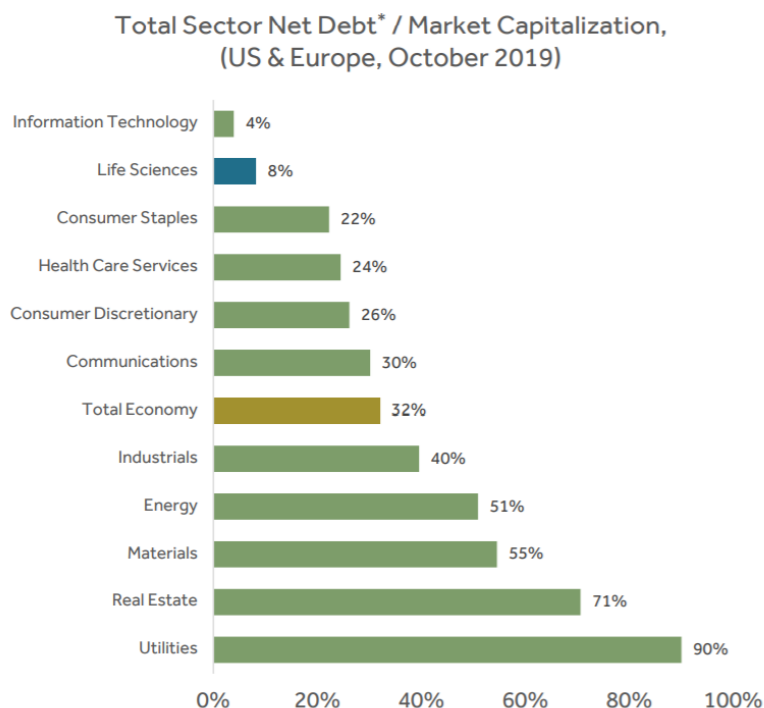


Note: The category "other" includes pharma services, life science tools and HCIT.

Source: S&P Capital IQ data from October 5, 2019, Torreya Calculations

Data further support the susceptibility of the biopharmaceutical industry to zombie firms. Despite the life sciences sector having only a quarter the average level of leverage in the US and Europe (Figure 3), some biopharmaceutical firms have managed to accrue leverage levels several hundred percentage points above the sector's 8% average (Figure 3, 4) and the 11.6% for the industry's top earners (Figure 2). Such high levels of leverage are unsustainable, though only 3 of the 9 firms in Figure 4 filed for bankruptcy within two years, indicating the lender leniency needed to sustain zombie firms. Indeed, other firms in the sample held various restructurings, such as Vivus' restructuring agreement with debt holder IEH Biopharma in May 2020 after failing to pay \$3.8 million in interest and \$170.1 million in principal (GlobeNewswire, 2020). In the absence of formal research: the presence of highly leveraged firms, debt servicing struggles and lender leniency further suggest that the current financial environment in the biopharmaceutical industry is conducive for zombification, and its associated moral hazards.

Figure 3: Comparisons of leverage levels across sectors (Torreya, 2019).



Note: We define net debt as total debt less cash less short-term investments

Source: S&P Capital IQ data from October 5, 2019, Torreya Calculations

Figure 4: Bankruptcies in sample of highly leveraged biopharmaceutical firms (the author; Plieth, 2018).

Selected disproportionately indebted biopharma groups (March 2018)			
	Market capitalisation (\$m)	Gross debt (\$m)	Debt/mkt cap
Pernix Therapeutics	28	284	995%
Vivus	53	236	443%
Novelion Therapeutics	58	250	429%
Egalet	46	135	294%
Aralez Pharmaceuticals	95	275	289%
Amag Pharmaceuticals	452	735	163%
Kempharm	59	92	156%
Moberg Pharma	58	72	125%
Depomed (now Assertio)	510	627	123%
Source: EvaluatePharma and SEC filings. Note: minimum \$20m market cap, and excluding larger, speciality companies; includes only loss-making or near loss-making companies.			
Updated June 2020: firms that have sought Chapter 11 protection under Title 11 of the United States Code are highlighted in red. Source: SEC filings.			



The micro-level moral hazards when zombie and other highly leveraged firms fail are clear. Taking the example of Pernix Therapeutics from Figure 4, it filed for bankruptcy and sold the majority of its assets to Highbridge Capital Management for \$75.6 million on April 4, 2019 (Visconti, 2019). However, in its last 8-K filing (Pernix Therapeutics Holdings, 2019), Pernix reported a decrease in total assets of \$114.9 million after the sale, indicating a negative asset price shock of \$39.3 million. Though only a rough estimation assuming no other asset sales, it nonetheless indicates how equity holders and some unsecured creditors can suffer complete losses on their claims. This is because accounts are kept on the assumption that $\text{Assets} = \text{Liabilities} + \text{Equity}$, and the shock renders $\text{Assets} < \text{Liabilities} + \text{Equity}$. Since secured liability claims assume legal priority for payment in most jurisdictions, followed by unsecured liability claims and finally all other claims (Baker McKenzie, 2020b), negative asset price shocks realise a surprise loss for many stakeholders of lower priority. As such, only secured claims were unimpaired in Pernix's liquidation (Pernix Therapeutics Holdings, 2019). Consequently, though Pernix's management levered highly to finance acquisitions (Pernix Therapeutics Holdings, 2015), they realised the cost of the risk on unsecured debt and equity holders.²

In the absence of research and data, the macro-level moral hazards of biopharmaceutical debt are less certain. However, given the existence of highly leveraged firms and the likelihood for the existence of zombie firms discussed above, it is likely young life sciences firms seeking late-stage debt finance will face congestion effects competing for capital and labour in the sector, as per Hallak et al. (2018) and Bannerjee and Hofmann (2018), which lowers innovation. While it may seem more efficient to leave drug development to large incumbent firms, given the high sunk costs, new entrants are actually a key driver for innovation in pharmaceuticals, with less than half of all drugs approved in America originating from the 15 largest pharmaceutical firms (Paul et al., 2010). Therefore, if young biopharmaceutical and other drug developing life sciences firms are crowded out from funding and talent, there may be a decrease in drugs available in the future, hindering healthcare quality. Furthermore, a build-up of unsustainable biopharmaceutical debt may lead to a worsening of economic downturns in interconnected organisations, as per Taleb (2012), which may disrupt a broader range of scientific innovation outside of life sciences. Overall, the macro-level moral hazards of biopharmaceutical debt remain to be determined, though there are clear indications of impaired innovation and inefficient allocation of resources in the life sciences sector and possibly beyond.

Mitigating Debt's Moral Hazard

From the above discussions, it is apparent that managers should consider the moral hazards associated with debt – namely asset price shocks, congestion effects and financial fragility – as part of stakeholder and social responsibility. Though new compared to established capital structure theories, ethical considerations of debt are not to be ignored, as the impacts of moral hazard can dictate the future business landscape. However, moral hazard is encouraged by current financial environments, such as lax direct lending regulations and the need for early-stage biopharmaceutical firms to access funding. Hence, it is not enough to advise prudence by way of boards and committees, but it needs to be facilitated by altering the financial environment.

The most sweeping solution to reduce systemic moral hazard, and the most drastic, would be to eliminate the use of leverage altogether. Taleb, who has long been vocal against debt, proposes the conversion of all existing debt into equity across entire economies (Taleb and Spitznagel, 2009). He has not elaborated on the exact mechanism this would take, only that it should be an organised and systematic method. While this approach would eliminate the root of the problem, it is perhaps too great a change for our current financial system, and it may incur adverse

² Note that the US Bankruptcy Code includes non-investors as unsecured creditors, such as employees owed money (Baker McKenzie, 2020b), which extends the scope for moral hazards arising from asset price shocks.



and unforeseeable consequences. For example, what would be a fair prioritisation of liquidation claims after existing debt holders convert into equity holders? Such is one of the many minutiae plaguing Taleb's ideal economy.

A more practical solution exists to reduce moral hazard at the micro-level. To prevent managers from shifting the risk onto other stakeholders, it helps for managers to own a sizeable stake in the company. Cook (1990) recommends for CEOs to have a target stock interest 15 times their annual salary, decreasing for each management hierarchy thereafter, to ensure prudent long-term management in tying the future wealth of managers to the value of the firm. This should prevent overconfident leveraging and the transfer of risk onto low liquidation priority stakeholders, as managers are now equity holders. However, managers may object that stock prices are not always a fair reflection of firm value (Shiller, 2015), and Bower and Paine (2017) argue that shareholder centred approaches to governance further divert from corporate social responsibilities.

Nevertheless, solutions should aim to fine-tune rather than overthrow, but perhaps there is no real need for intervention. Despite the ethical critiques and economic outlook this essay has given, the biopharmaceutical industry has fared reasonably well so far, with new drug approvals doubling over the last ten years (Mikulic, 2020). It may be that society does benefit from debt overall, from moral hazard incentivised risk taking as per Claassen (2015). Yet, with experts predicting another historic collapse of debt a mere twelve years since 2008 (Walsh, 2020), this essay maintains an ontology of subtractive knowledge: that "we know a lot more what is wrong than what is right" (Taleb, 2012, p.303).

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