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Impact-Weighted Accounts Project Research Report

Abstract

We apply the product impact measurement framework of the Impact-Weighted Accounts Initiative (IWAI) in two competitor companies within the pharmaceuticals industry. We design a monetization methodology that allows us to calculate monetary impact estimates of accessible product provision and efficacy, among other factors. Our results indicate substantial differences in the impact that competitors have through their products. These differences demonstrate how impact reflects corporate strategy and informs decision-making on industry-specific areas.

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1. Introduction

Although significant progress has been made in the environmental, governance and social metrics disclosed by companies and prescribed by various reporting standards, these mostly pertain to a company's operations and are still not embedded in financial statements. In contrast to employment or environmental impacts from operations, product impacts, which refer to the impacts that occur from usage of a product once a company has transferred control of the good or service, tend to be highly idiosyncratic and not well-defined, limiting the ability to generalize and scale such measurements. As such, for companies that do measure product impact, impact evaluation is highly nuanced, limiting comparability, scalability and utility. Moreover, the number of companies that have managed to consider and measure product impact in monetary terms is even more limited and presents a missed opportunity to inform operational and investment decisions.

We have put forth a framework in which product impacts can be measured, monetized and compared in a systematic and repeatable methodology across industries and have previously provided a sample application to the automobile manufacturing industry.[1] Within any industry, the framework can be applied using a set of standard principles, industry assumptions and public data to estimate product impacts across the following seven dimensions.

FIGURE 1

Product Impact Framework Dimensions

Reach		Dimensions of Customer Usage			Env Use	End-of-life
Quantity	Duration	Access	Quality	Optionality	Pollutants & efficiency	Recyclability
The magnitude of individuals reached	Length of time the product can be used, particularly for durables	Accessibility of product through pricing and efforts to provide for the underserved	Quality of product through health, safety, effectiveness, and inherent need or goodness	Ability to choose an alternative product with full information and free will	All pollutants and efficiencies enabled through customer usage	Projected product volume recycled at end of product life

[1]George Serafeim and Katie Trinh. "A Framework for Product Impact-Weighted Accounts", Harvard Business School. Accessed July 6, 2020.

In this paper we apply the framework to two competitor companies in the pharmaceutical (product) industry. We then discuss potential data points and data sources for monetization and detail the decisions behind assumptions made. Finally, we provide examples of insights specific to the pharmaceutical industry that can be derived from impact-weighted financial accounts and their analysis. The application of the product impact framework to the pharmaceutical industry demonstrates feasibility and actionability, while also providing guidance on the nuances and decision-making of applying the framework to other similar industries. The impacts derived demonstrate the potential for product impact measurement to inform strategic and potentially investment decision-making. We see our results as a first step on a journey, rather than a definitive answer, towards more systematic measurement of product impact in monetary terms that can then be reflected in financial statements with the purpose of creating impact-weighed financial accounts.

2. Application of the product impact framework

We apply the product impact framework of the Impact-Weighted Accounts Initiative within the pharmaceutical industry to ensure the framework is feasible, scalable, and comparable. Through an analysis of two competitor companies, we provide a cohesive example that examines the impacts of pharmaceutical companies across the seven product impact dimensions of the framework to uncover nuances of the framework application in estimating actual monetary values. The companies will be referred to as Companies A and B given the purpose of this exercise is to examine feasibility and not to assess the performance of individual companies. We do note that the data is from two of the largest pharmaceutical firms globally.

2.1 Data collection process

This application is based on publicly available data from company disclosures and industry-wide assumptions informed by regulatory bodies and established research firms. These examples make use of existing data and metrics with the goal of incorporating publicly available data.

Self-disclosed company datapoints reflect information found in the company's disclosures from 2018 such as the Form 10-K or annual sustainability reports, which increasingly disclose Sustainability Accounting Standards Board (SASB) and Global Reporting Initiative (GRI) metrics.

Industry-wide assumptions on treatment price and efficacy come from Medicaid, prescribing information, and various economic, academic, and medical studies. Given the methodology determines monetary impacts, the industry wide assumptions inevitably rely on some market-determined price and valuations.

3. Pharmaceuticals application of the product impact framework

3.1 Overall impacts estimated

TABLE 1

Product Impacts of Company A and B

						Dimensions of Customer Usage								
						Reach	Access		Quality			Option-ality	Env Use	End of Life
Company	Revenue	Relevant Impact Revenue	Positive Product Impact	Negative Product Impact		Quantity	Affordability	Underserved	Health & Safety	Effectiveness	Need	Monopoly	Emissions	Recyclability
A	$42bn	$25bn	$42bn	-$12bn	Categories represented	5	$4,751m	$1,430m	-	$10,029m	$25,958m	-$11,752m	-$17m	-$5m
					Patients treated	135m								
B	$17bn	$14bn	$30bn	-$6.5bn	Categories represented	1	-	$954m	-	-	$28,560m	-$6,499m	-$7m	-$2.1m
					Patients treated	29m								

For the pharmaceuticals industry, the access dimension captures affordability of pharmaceutical drugs and service provision to emerging market and other underserved populations through access and procurement programs. The quality dimension captures drug safety and recalls, pharmaceutical efficacy, and the basic health benefits enabled by pharmaceuticals. The optionality dimension captures price rents[2] from monopoly exposure. The environmental usage dimension captures emissions from product use and the recyclability dimension, emissions associated with end-of-life treatment. The following sections dive into the details, assumptions, and decisions behind these estimated impacts.

[2] As defined by the OECD per the "Glossary of Industrial Organisation Economics and Competition Law", In modern economics, rent refers to the earnings of factors of production (land, labour, capital) which are fixed in supply. Thus, raising the price of such factors will not cause an increase in availability but will increase the return to the factor… When the availability of a good is artificially restricted (for example by laws limiting entry), then the increased earnings of the remaining suppliers are termed monopoly rents."

3.2 Reach

3.2.A Reach in pharmaceuticals

The goal of the Reach dimension is to identify the number of individuals served by the company. For pharmaceutical companies, we estimate or identify the number of patients reached through financial disclosure data. Given data availability, we do not estimate the product impact for each pharmaceutical product sold and we limit ourselves to common product categories found across leading pharmaceutical companies. We identify these common product categories by examining six leading pharmaceutical companies and limiting this example to the following categories in which at least half of the firms manufacture a drug for the following: Cardiovascular, Diabetes, Immunology, Neuroscience, Oncology, Vaccines, and Women's Health.

TABLE 2

Estimated Patients Reached by Company A and B

Data			
Company datapoints		**A**	**B**
	Patients reached per category		
Estimated from financial disclosures	Oncology	1,088,935	
	Vaccines	128,654,690	
	Immunology	40,251	
	Diabetes	3,449,984	28,900,000
	Cardiovascular	1,430,325	

3.2.B Data on patients reached

We look to company financial disclosures for data on the number of patients reached. Where firms disclose the number of patients they have reached, we apply that figure directly in this dimension. Where companies do not disclose this data, we identify category revenue and leading treatment from the company's financial disclosures, treatment price from Medicaid data[3], and company-specific price premium for products within the US to estimate patients reached.[4] For Company A, we estimate the number of patients treated given public data availability and for Company B, we apply the number of patients treated as identified in financial disclosures.

[3] "Medicaid Drug Spending Dashboard". *Center for Medicare & Medicaid Services.* Updated 2020. Available at: https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Information-on-Prescription-Drugs/Medicaid. Accessed July 2020.
[4] Nancy L. Yu, Zachary Helms, and Peter B. Bach. "R&D Costs for Pharmaceutical Companies Do Not Explain Elevated US Drug Prices". *Health Affairs Blog*. Published March 7, 2017. Accessed May 2021.

3.2.C Estimating patients reached

We estimate the number of patients reached by dividing the relevant category revenue by the estimated treatment price scaled for the US price premium where companies do not disclose an estimate of patients reached.

TABLE 3

Estimating Patients Reached by Company A

Data			Estimation	
Company datapoints		**A**		**A**
10K	Immunology revenue	$1,475m	Immunology revenue	$1,475m
Medicaid	Price per dose of lead product	$7,830		÷
Presc. Info	Annual doses per treatment	12	(Price per dose	$7,830
				x
Industry assumptions			Doses per treatment	12
Health Affairs	Company US price premium	39%		x
			Company US price premium)	39%
				=
			Patients reached	**40,251**

Given data availability, we apply the simplifying assumption in this example that the leading product within the seven selected categories represents impact and reach across the entire category. We note that the dosage per treatment is an approximation given dosage can vary by condition and patient and is ultimately dependent on physician discretion. The number of patients reached can also be affected by adherence factors. However, we do not currently account for adherence in estimating the number of patients reached given limited adherence data exists and adherence reflects more than company decision-making as it is also driven by consumer behavior. As adherence data becomes more readily available, patients reached could then be estimated with appropriate adjustments for adherence.

A pharmaceutical company estimating its own product impact with more granular data on patients reached or access to private data on patients reached from various health industry data providers, such as IQVIA can rely on more direct estimates and data on number of patients treated rather than the methodology applied in this example.

3.3 Access

The goal within access is to estimate both the impact from provision of a more affordable product and the impact from provision of a product to underserved consumers. In the case of pharmaceuticals, we examine the impact from affordable pharmaceutical treatment and service provision to emerging market and other underserved populations through access and procurement programs.

3.3.A Pharmaceutical affordability

The goal of the affordability dimension is to identify the positive impact of more affordable product or service provision. Affordability in the pharmaceutical industry aims to capture the impact of providing pharmaceutical drugs more affordably than others in the industry. This can be measured with estimates of annual treatment price.

TABLE 4

Affordability of Company A and B

Data			
Company datapoints		**A**	**B**
Medicaid	Treatment price of lead product		
	Oncology	$19,410	
	Vaccines	$145	
	Immunology	$93,961	
	Diabetes	$4,696	$11,169
	Cardiovascular	$3,639	
Industry assumptions			
Medicaid	Avg. price of alternative lead product		
	Oncology	$7,446	
	Vaccines	-	
	Immunology	$55,504	
	Diabetes	$6,073	$9,995
	Cardiovascular	$2,052	

Estimation		
	A	**B**
Avg. price of alternative lead product	6,073	9,995
	-	
Treatment price of lead product	$4,696	$11,169
	=	
Affordability of lead product	$1,377	$0
	x	
Patients reached	3,449,984	28,900,000
	=	
Diabetes treatment affordability	$4,751m	$m
Overall affordability impact	**$4,751m**	**$m**

3.3.B Pricing data

We estimate treatment affordability with pricing data from Medicaid. For each product category, we assume, as discussed in section 3.2, that the company's leading drug by revenue is representative of the category's affordability. We identify the average price per dose of the leading drug and the approximated dosage per treatment to estimate an average treatment price. For each

leading drug, we identify alternate treatments from the FDA's information by drug class.[5] We then estimate the average price per treatment of the alternate treatments using pricing data from Medicaid and dosage information from the prescribing information. We recognize that Medicaid pricing represents estimates of treatment price within a single geography, the US. Given pharmaceutical prices in the US tend to be higher than in other markets, we believe this example using US pricing data provides a conservative estimate of the affordability impact.

3.3.C The impact estimate

To estimate treatment affordability, we take the differential between the average price of alternate treatments and the lead product treatment price with a floor at zero and multiply with the patients reached as shown in Table 3 with the example of the diabetes category. We calculate the overall affordability impact by repeating the above calculation for all product categories. For this example, we assume the leading product by revenue for each category is representative of the category's affordability impact. A company could estimate a more granular affordability impact by applying this methodology at the product level for all products.

3.4 Access – Underserved

3.4.A The underserved customer

The goal of the underserved dimension is to identify the impact associated with provision of service to underserved customers. In the pharmaceuticals space, we can identify which pharmaceutical product sales are affordable and beneficial to underserved populations through procurement of products within the World Health Organization's list of prequalified medicinal products.[6] This example focuses on WHO prequalified medicinal products given current disclosures, per SASB metric HC-BP-240a.2 (list of products on the WHO List of Prequalified Medicinal Products as part of its Prequalification of Medicines Programme). This decision also aligns with our conservatism principle and ensures the products are of a well-accepted standard of quality, safety, and efficacy. Towards the goal of estimating the impact from affordable provision of beneficial pharmaceutical products to underserved populations, a company estimating their

[5] "Information by Drug Class". *US Food & Drug Administration.* Updated September 2020. Accessed December 2020.
[6] As described by the World Health Organization, "The vision of WHO medicines prequalification is simple: good quality medicines for everyone. Its mission is to work in close cooperation with national regulatory agencies and partner organizations to make quality priority medicines available for those who urgently need them. This is achieved through assessment and inspection activities, building national capacity for manufacture, regulation and monitoring of medicines, and working with regulators to register those medicines quickly."

underserved impact could conservatively include efforts across other access programs that meet these criteria. We note that within the underserved dimension, the efforts we examine within the product framework of IWAI are aligned with the Access to Medicine Foundation's Product Delivery Technical Area. We note that this framework does not examine research and development or governance efforts on access as the IWAI product framework accounts for impacts only once they have been realized.

TABLE 5

Underserved Customers of Company A and B

Data			
Company datapoints		**A**	**B**
CSR & Procurement reports	Estimated patients reached		
	Family Planning	6,500,000	-
	Vaccines	9,145,555	-
	Diabetes	-	300,000
Industry assumptions			
UNFPA	Averted cost through family planning	$34.26	
HSPH	Social & economic ROI from vaccines	$132.00	
ADA	Global cost of diabetes	$3,180.72	

Estimation	**A**	**B**
Family planning patients reached	6,500,000	-
	x	
Averted cost of family planning	$34.26	
	=	
Family planning for underserved	$223m	-
Vaccine patients reached	9,145,555	-
	x	
S/EROI from vaccines	$132.00	
	=	
Vaccines to underserved	$1,207m	-
Diabetes patients reached	-	300,000
	x	
Global cost of diabetes	$3,180.72	
	=	
Diabetes care for underserved	-	$954m
Underserved impact	**$1,430m**	**$954m**

3.4.B Pre-qualification and procurement data

To identify which products meet the WHO prequalification standard, we examine company disclosure per SASB metric 240a.2. Company A provides a list of the products that meet this standard. We then estimate the number of individuals reached through procurement of these products by the units guaranteed in procurement deals as reported by the Reproductive Health Supplies Coalition[7], Market Information for Access to Vaccines[8], and The Global Fund.[9] We recognize that these reported procurement deals likely understate the total procurement enabled by pharmaceutical companies. A company estimating their own underserved impact would have more

[7] "Product Brief Caucus on New and Underused Reproductive Health Technologies". *Reproductive Health Supplies Coalition.* Published July 2013. Accessed July 2020.
[8] "MI4A: Vaccine Purchase Data". *World Health Organization.* Updated August 2020. Available at: https://www.who.int/immunization/programmes_systems/procurement/mi4a/platform/module1/en/. Accessed July 2020.
[9] "Price & Quality Reporting Summary". *The Global Fund.* Updated April 2020. Accessed July 2020.

internal information available to comprehensively estimate their underserved impact. For Company B, we apply the firm's estimate of individuals they have reached through access programs.

The per person value of access to family planning products is estimated from the United Nations Population Fund.[10] We divide the total estimated healthcare cost savings enabled by the UNFPA contraceptive provision by the number of people reached by UNFPA family planning programs and services. The value of vaccine provision to the underserved is estimated by the John Hopkins Bloomberg School of Public Health to be 44 times the vaccination cost[11] and the vaccination cost is estimated at $3 per vaccination by the Disease Control Priorities Project of the World Bank.[12] We estimate the value of provision of diabetes products with a proxy of the per person global cost associated with diabetes from the American Diabetes Association.[13]

3.4.C The impact estimate

We multiply the number of patients reached through procurement and access programs by the value enabled or averted cost of access the specific product provided by the procurement or access programs. A company estimating their own underserved impact could estimate the value enabled or averted cost associated with the specific products provided in their procurement or access programs following the methodology described in section 3.4.B.

3.5 Quality – Health and Safety

The health and safety dimension aims to capture instances where a customer's health, safety, or privacy has been breached. For a pharmaceutical company, a health and safety impact could be estimated with recall volume and other FDA reporting. In 2018, neither firm had a serious recall or FDA reported issue per SASB metrics 250a.1 (products listed in the FDA's MedWatch Safety Alerts), 250a.2 (fatalities associated with products as reported in the FDA Adverse Event Reporting System) or 250a.3 (recalls issued, total units recalled).

[10] "Annual Report 2016". *United Nations Population Fund.* Published 2016. Accessed July 2020.
[11] Sachiko Ozawa, Samantha Clark, Allison Portnoy, Simrun Grewal, Logan Brenzel and Damian Walker. "Return on Investment from Childhood Immunization in Low- and Middle-Income Countries, 2011–2020". *Health Affairs* 35(2):199-207. Published February 2016. Accessed July 2020.
[12] Susan Foster, Richard Laing, Bjørn Melgaard, and Michel Zaffran. 2006. "Ensuring Supplies of Appropriate Drugs and Vaccines" in *Disease Control Priorities in Developing Countries.* 2nd edition. *Washington (DC): The World Bank*
[13] Christian Bommer, Vera Sagalova, Esther Heesemann, Jennifer Manne-Goehler, Rifat Atun, Till Bärnighausen, Justine Davies, and Sebastian Vollmer. "Global Economic Burden of Diabetes in Adults: Projections From 2015 to 2030". *Diabetes Care* 41(5): 963-970. Published May 2018. Accessed July 2020.

For demonstrative purposes, we describe the methodology for estimating the health and safety impact with a 2004 recall of a nonsteroidal anti-inflammatory drug linked to heart attacks. We multiply the number of individuals affected by the recalled product[14] (27,785) by the medical cost associated with a heart attack[15] ($760,000) to estimate the health and safety impact of this recall at -$21.1 billion. A company estimating their health and safety impact could identify the recalled products, reason for recall, and apply the relevant cost associated with the reason for recall.

3.6 Quality – Effectiveness

3.6.A Pharmaceutical effectiveness

In the effectiveness dimension, we aim to capture whether the product or service is effective at meeting customer expectations. For pharmaceuticals, we examine the efficacy of treatment and minimum efficacy of alternate treatments available. We note that with pharmaceuticals, we apply the minimum efficacy of alternate treatments rather than the average efficacy. This decision reflects the assumption that all effective medical treatment creates positive impact with treatments that are less effective than the industry average creating positive impact of lesser magnitude. This aligns with our treatment of effectiveness impacts in industry applications to consumer-packaged foods[16] and water utilities[17] where the direction of the impact is determined and the magnitude of that impact is what varies.

For each set of treatments, we identify a commonly reported measure of efficacy to enable comparison between different treatments. For Company A's oncology treatment, we examine survival rate at follow-up (one year). For Company A's vaccine, we examine rate of cervical cancer prevention. For Company A's immunology treatment, we examine the percent of patients achieving ACR50[18] at six months. For Company A's diabetes treatment, we examine the percent of patients achieving A1C < 7%. For Company A's cardiovascular treatment, we examine reduction in LDL-C[19] and the associated reduction in risk for a cardiovascular event. For Company

[14] "Report: Vioxx linked to thousands of deaths". *NBC News.* Published October 2004. Accessed July 2020.
[15] Steve Vernon. "How much would a heart attack cost you?". *CBS News.* Published April 2010. Accessed July 2020.
[16] Amanda Rischbieth, George Serafeim and Katie Trinh. "Accounting for Product Impact in the Consumer-Packaged Foods Industry", Harvard Business School. Accessed April 2021.
[17] George Serafeim and Katie Trinh. "Accounting for Product Impact in the Water Utilities Industry", Harvard Business School. Accessed April 2021.
[18] Per the American College of Rheumatology, "the ACR50 is a composite measure defined as both improvement of 50% in the number of tender and number of swollen joints and a 50% improvement in three of the following five criteria: patient global assessment, physician global assessment, functional ability measure, visual analog pain scale, and erythrocyte sedimentation rate or C-reactive protein".
[19] Per the Centers for Disease Control and Prevention, "LDL-C (low-density lipoprotein cholesterol), sometimes called 'bad' cholesterol, makes up most of your body's cholesterol. High levels of LDL-C raise your risk for heart disease and stroke.

B's diabetes treatment, we also examine the percent of patients achieving A1C[20] < 7%. We provide the efficacy measures applied across Company A and B's treatments to highlight that with pharmaceutical companies, identifying the appropriate measure of efficacy is highly specific to the treatment or product. While not an issue of framework scope, we note that these intricacies to determining the appropriate measure of efficacy highlight the following potential measurement issues. With long-term treatments, as with Company B's diabetes treatment, efficacy is more difficult to measure. Efficacy is also influenced by concurrent treatments, condition, and other patient-specific characteristics. We acknowledge the experimental nature of determining appropriate measures of efficacy and look to guidance from medical literature to identify reasonable estimates.

TABLE 6

Effectiveness Impact of Company A and B

Data				Estimation		
Company datapoints		**A**	**B**		**A**	**B**
Prescribing Information	Effectiveness of lead product			Effectiveness of lead product	47%	37%
	Oncology	71%			-	
	Vaccines	98%		Minimum effectiveness of alternate	28%	37%
	Immunology	31%			=	
	Diabetes	47%	37%	Difference in effectiveness	19%	0%
	Cardiovascular	47%			x	
				Patients reached	3,449,984	28,900,000
Industry assumptions					x	
Prescribing Information	Minimum effectiveness of alternate			Associated averted cost	$2,647	$2,647
	Oncology	46%		Diabetes treatment effectiveness	$1,735m	$m
	Vaccines	98%		**Overall effectiveness impact**	**$10,029m**	**$m**
	Immunology	28%				
	Diabetes	28%	37%			
	Cardiovascular	47%				
Medical Literature	Associated averted productivity cost					
	Oncology	$30,444				
	Vaccines	$5				
	Immunology	$5,822				
	Diabetes	$2,647	$2,647			
	Cardiovascular	$11,190				

3.6.B Data on clinical efficacy

We identify data on the measures of clinical efficacy outlined in section 3.6.A in the prescribing information of the relevant treatments. We turn to the medical literature for estimates

[20] Per the National Institute of Diabetes and Digestive and Kidney Diseases, "A1C is a blood test for type 2 diabetes and prediabetes. It measures your average blood glucose, or blood sugar, level over the past 3 months… Doctors also use the A1C to see how well you are managing diabetes. Your A1C test result is given in percentages. The higher the percentage, the higher your blood sugar levels have been… The A1C goal for many people with diabetes is below 7".

of the medical, productivity and indirect costs associated with the diseases these treatments target to estimate the value associated with higher clinical efficacy.

For Company A's oncology treatment, we apply the averted medical costs associated with cancer over six months.[21] For Company A's vaccine, we apply the annual medical cost associated with cervical cancer[22] and scale by global cervical cancer prevalence[23]. For Company A's immunology treatment, we apply the annual indirect productivity cost associated with rheumatoid arthritis.[24] For Company A and B's diabetes treatment, we apply the indirect productivity cost associated with diabetes.[25] For Company A's cardiovascular treatment, we apply the medical and indirect cost of coronary heart disease.[26] We note that we do not account for mortality rates and instead focus on medical and productivity costs associated with various health outcomes. This allows us to estimate monetary impacts while avoiding the ethical dilemma and discussion associated with the statistical value of a life (VSL).[27] [28] These estimates aim to capture the value enabled by higher clinical efficacy of treatment and the latest guidance from medical literature should further refine these estimates.

3.6.C The impact estimate

In Table 6, we provide an example of estimating the effectiveness impact with Company A and B's lead diabetes treatment. We calculate the difference between the treatment efficacy and the minimum efficacy of alternate treatments to determine Company A and B's treatment efficacy above the industry treatment minimum. We multiply the difference in efficacy rate by the number of patients reached to estimate the number of patients that have achieved better outcomes by using Company A and B's treatment for their condition. To estimate the overall effectiveness impact for the diabetes treatments, we multiply the number of patients that have achieved better outcomes

[21] K. Robin Yabroff, Jennifer Lund, Deanna Kepka, and Angela Mariotto. "Economic Burden of Cancer in the US: Estimates, Projections, and Future Research". *Cancer Epidemiol Biomarkers Prev.* 20(10): 2006-2014. Published October 2011. Accessed July 2020.
[22] Harrell W. Chesson, Donatus U. Ekwueme, Mona Saraiya, Meg Watson, Douglas R. Lowy, and Lauri E. Markowitz. "Estimates of the annual direct medical costs of the prevention and treatment of disease associated with human papillomavirus in the United States". *Vaccine* 30(42): 6016-6019. Published September 2012. Accessed July 2020.
[23] Marc Arbyn, Elisabete Weiderpass, Laia Bruni, Silvia de Sanjose, Mona Saraiya, Jacques Ferlay, and Freddie Bray. "Estimates of incidence and mortality of cervical cancer in 2018: a worldwide analysis". *The Lancet Global Health* 8(2): 191-203. Published February 2020. Accessed July 2020.
[24] Gary M. Owens. "Managed Care Implications in Managing Rheumatoid Arthritis". *AJMC* 20(7). Published May 2014. Accessed July 2020.
[25] "The Cost of Diabetes". *American Diabetes Association. Published 2017. Accessed July 2020.*
[26] "Cardiovascular Disease: A Costly Burden for America", American Heart Association. Published 2017. Accessed August 2020.
[27] : Andersson, H. and N. Treich: 2011, Handbook in Transport Economics, Chapt. 'The Value of a Statistical Life', pp. 396-424, in de Palma, A., R. Lindsey, E. Quinet and R. Vickerman (eds.) Edward Elgar, Cheltenham, UK.
[28] Lisa A. Robinson. "How US Government Agencies Value Mortality Risk Reductions". *Review of Environmental Economics and Policy.* Published January 2007. Accessed April 2021.

with the associated averted costs enabled by higher efficacy. We repeat this methodology for the other representative treatments to calculate the effectiveness impact for both companies.

3.7 Quality – Basic Need

3.7.A Basic needs met by pharmaceuticals

The basic need dimension examines whether the product or service provides some basic need to the population. As discussed in the initial product framework paper, elasticity can be used to identify products that are basic needs.[29] In the case of pharmaceuticals, provision of pharmaceutical drugs meets a basic need of health. Examining the price elasticity of pharmaceuticals cements this designation as the long-run price elasticity is in the inelastic range.[30]

TABLE 7

Basic Need Impact of Company A and B

Data			
Industry assumptions		**A**	**B**
Prescribing Information	Minimum effectiveness of alternate		
	Oncology	46%	
	Vaccines	98%	
	Immunology	28%	
	Diabetes	28%	37%
	Cardiovascular	47%	
	Associated averted productivity cost		
	Oncology	$30,444	
	Vaccines	$5	
	Immunology	$5,822	
	Diabetes	$2,647	$2,647
	Cardiovascular	$11,190	

Estimation		
	A	**B**
Minimum treatment effectiveness	28%	37%
	x	
Patients reached	3,449,984	28,900,000
	x	
Associated averted cost	$2,647	$2,647
Diabetes treatment basic need	$2,557m	$28,560m
Overall basic need impact	**$25,958m**	**$28,560m**

3.7.B Minimum efficacy and health cost data

To estimate the health outcomes enabled by the pharmaceutical drug, we examine the minimum efficacy for the type of pharmaceutical drug. This provides us with an estimate of the percent of individuals who have achieved positive health outcomes attributable to the pharmaceutical drug. The estimates identified for minimum clinical efficacy are the same as those identified and discussed in section 3.6.B for effectiveness. We note that the minimum efficacy for

[29] George Serafeim and Katie Trinh. "A Framework for Product Impact-Weighted Accounts", Harvard Business School. Accessed July 6, 2020.
[30] Adil Abdela and Marshall Steinbaum. "The United States has a Market Concentrating Problem". Roosevelt Institute. Published September 2018. Accessed April 2021.

Company A and B's diabetic treatments differs since the treatments have different alternates as they lower blood sugar through different avenues.

To identify the value of enabled health, we examine the averted medical and indirect productivity costs associated with successful treatment. The estimates identified for averted medical and indirect productivity costs associated with treatment are also the same as those identified and discussed in section 3.6.B for effectiveness.

3.7.C The impact estimate

In Table 7, we provide an example of estimating the basic need impact with Company A and B's lead diabetes treatment. We multiply the minimum effectiveness of the two treatment types by the estimated number of patients reached and the averted indirect costs associated with lack of treatment. We repeat this methodology for the other representative treatments to calculate the basic need impact for both companies.

3.8 Optionality

TABLE 8

Optionality Impact of Company A and B

Data				Estimation		
Company datapoints		**A**	**B**		**A**	**B**
Financial disclosures	Revenue			Revenue across product categories	$25,004m	$13,828m
	Oncology	$8,243m			x	
	Vaccines	$7,261m		Industry price rent from monopoly	47%	
	Immunology	$1,475m			=	
	Diabetes	$5,995m	$13,828m	**Optionality impact**	**-$11,752m**	**-$6,499m**
	Cardiovascular	$2,030m				
Industry assumptions						
	Industry price rent from monopoly	47%				

3.8.A Optionality in pharmaceuticals

The optionality dimension aims to capture the impact from consumers lacking freedom of choice when making a purchase, which we determine by examining whether the industry is monopolistic, whether the product or service is addictive, and whether there have been any information failures as previously discussed per the impact-weighted accounts product framework.[31] In the case of pharmaceuticals, consumers can sometimes lack freedom of choice

[31] George Serafeim and Katie Trinh. "A Framework for Product Impact-Weighted Accounts", Harvard Business School. Accessed July 6, 2020.

given the industry's monopolistic nature, as evidenced by the industry's HHI which exceeds 2,900.[32] While the monopolistic nature of the industry could enable investments in research and development, it could also lead to high barriers to entry, low competition, and supranormal rents for incumbents. The optionality impact estimates the losses consumers face from anti-competitive price rents.

3.8.B Monopolistic pricing and exposure data

Overall treatment sales revenue for Companies A and B come from financial disclosures. We identify the impact of the pharmaceutical monopolistic nature on pricing as a 47% price premium as estimated by the Open Markets Institute[33] and assume all customers are exposed to these monopolistic effects. We note that firm variation on the optionality dimension is thus solely price driven in this example. As the academic and medical literature identifies characteristics that allow for firm differentiation in monopolistic price rent behavior, those nuances could be incorporated to estimate the optionality impact.

3.8.C The impact estimate

To estimate the optionality impact, we multiply the total revenue from the treatment categories of interest by the anti-competitive price premium for pharmaceuticals.

3.9 Environmental Usage

3.9.A Environmental usage in pharmaceuticals

The environmental usage dimension aims to capture any environmental emissions, pollutants, or efficiencies produced from use of the product. For pharmaceuticals, we estimate the impact from the emissions generated by customer usage of the service.

[32] Adil Abdela and Marshall Steinbaum. "The United States Has A Market Concentration Problem". *Roosevelt Institute*. Published 2018. Accessed July 2020.
[33] Michael Bluhm. "The Role of Monopoly in America's Prescription Drug Crisis". *Open Markets*. Published December 2019. Accessed July 2020.

TABLE 9

Environmental Usage Impact of Company A and B

Data				Estimation		
Company datapoints		**A**	**B**		**A**	**B**
GRI 305-3	Emissions from use	148,100	60,141	Emissions from usage	148,100	60,141
					x	
Industry assumptions				Cost per ton of carbon	$114	
IWAI	Cost per metric ton of carbon	$114			=	
				Emissions impact	**-$17m**	**-$7m**

3.9.B Environmental usage data

We identify a company's emissions from product use in their corporate sustainability reporting. Company A's sustainability disclosure reports the emissions associated with product use per GRI metric 305-3. Since Company B's disclosures outline activities and measures taken to limit emissions associated with product use but do not report emissions, we estimate an environmental usage impact for Company B assuming Company B generates the same emissions from use per dollar of revenue as Company A. The cost associated with a metric ton of carbon is estimated in the environmental framework of the Impact-Weighted Accounts.[34]

3.9.C The impact estimate

We estimate a company's environmental usage impact by multiplying the emissions from usage by the cost of emissions.

3.10 End-of-life Recyclability Impact

3.10.A End-of-life impact in pharmaceuticals

The end-of-life dimension aims to measure the averted and created emissions from the end-of-life treatment of the product, as well as the associated volume of product associated with the end-of-life treatment. For pharmaceuticals, the end-of-life dimension captures the impact associated with the waste after pharmaceutical administration, including packaging and other remaining material. As the industry continues to adopt end-of-life and other recyclability innovations, we would expect disclosure and reporting on these innovations to improve, enabling more comprehensive impact estimates. For example, while this example does not delve into the

[34] David Freiberg, DG Park, George Serafeim, and T. Robert Zochowski. "Corporate Environmental Impact: Measurement, Data and Information". Harvard Business School Working Paper, No. 20-098. Published March 2020.

emerging issue of pollution from pharmaceutical product waste given current levels of disclosure around unused waste product,[35] these effects would be captured in the end-of-life dimension. Within the Sustainability Accounting Standard for Biotechnology and Pharmaceuticals, metric HC-BP-250a.4 covers the amount of unused product that is accepted through take-back initiatives. While this metric focuses on the handled unused product, the effects from all unused waste product could be estimated within this dimension as disclosures and public data become more readily available on unused product waste.

TABLE 10

End-of-Life Impact of Company A and B

Data			
Company datapoints		**A**	**B**
GRI 305-3	Emissions from end-of-life treatment	44,900	18,233
Industry assumptions			
IWAI	Cost per metric ton of carbon	$114	

Estimation		
	A	**B**
Emissions from usage	44,900	18,233
	x	
Cost per ton of carbon	$114	
	=	
End of life impact	**-$5m**	**-$2m**

3.10.B Waste generation and recyclability data

For this example, we apply the company's emissions from end-of-life treatment given data availability in corporate sustainability reporting. Company A's sustainability disclosure reports the emissions associated with end-of-life per GRI metric 305-3. Company B's disclosures provide examples of efforts to design recyclable and recoverable products and efforts to recover plastic waste, such as those found in insulin pens. Since these disclosures do not detail the waste or recover volumes or associated emissions, we estimate an end-of-life impact for Company B by assuming Company B generates the same emissions from end-of-life treatment per dollar of revenue as Company A. The cost associated with a metric ton of carbon is estimated in the environmental framework of the Impact-Weighted Accounts.[36]

3.9.C The impact estimate

[35] David Freiberg, Jean Rogers, and George Serafeim. "How ESG Issues Become Financially Material to Corporations and Their Investors. Harvard Business School Working Paper, No. 20-056. Revised November 2020.
[36] David Freiberg, DG Park, George Serafeim, and T. Robert Zochowski. "Corporate Environmental Impact: Measurement, Data and Information". Harvard Business School Working Paper, No. 20-098. Published March 2020.

We estimate a company's end-of-life recyclability impact by multiplying the emissions from end-of-life treatment by the cost of emissions. A company with internal data on generated, recycled, and recovered waste volume could estimate a more comprehensive end-of-life impact.

4. Discussion

This application of the product framework to pharmaceuticals not only indicates feasibility of estimating monetary product impacts within this industry, but also demonstrates the potential value of impact-weighted financial statement analysis.

The product impact dimensions reflect key elements of the nature of the pharmaceuticals industry. Basic need is the leading driver of product impact in this industry, which reflects the value generated to customers through addressing health needs. The optionality dimension reflects the significant costs to consumers associated with the monopolistic nature of the industry. The effectiveness and affordability dimensions are also drivers of product impact for firms that are more affordable and more effective than their competitors. The underserved dimension demonstrates the unmet health needs of potential customers in emerging markets.

Within a single industry, one can identify differences in how the two companies approach different product attributes. For example, our analysis suggests that Company A is more affordable and effective than Company B. However, Company B's treatments meet more critical health needs. Both firms have similar underserved impact. Analyzing each dimension allows for a deeper understanding of the product impact performance of each company relative to competitors and the broader industry.

Finally, the impact-weighted financial statement analysis indicates which dimensions are most material to product impact creation. In pharmaceuticals, the impact is driven mostly by basic need, optionality, and effectiveness.

5. Conclusion

Although interest in ESG measurement continues to grow significantly, product impact has been difficult to systematically measure given the idiosyncratic nature of the impacts and the tendency to view products in broad categorizations of simply good and bad.[37] The creation of a

[37] For example as discussed in the outline of the initial product framework per "A Framework for Product Impact-Weighted Accounts", coal and tobacco are products that tend to be categorized as simply bad.

product impact framework allows for a systematic methodology that can be applied to different companies across a wide range of industries. This enables transparency, comparability, and scalability within product impact reporting. The identified standard dimensions on which product impact can be measured are rooted in existing measurement efforts, allowing data that is publicly available to be leveraged.

To ensure applicability, determine feasibility, and identify nuances within each dimension of product impact, we examine applications of the framework to company pairs across each Global Industry Classification Standard (GICS) sector. In this working paper, we provide a sample application to the pharmaceutical industry. We use publicly disclosed data and industry-wide assumptions to derive monetary estimates of a product's reach, accessibility, quality, optionality, environmental use emissions and end-of-life recyclability. While publicly disclosed data can provide meaningful insights, use of internal company data can further enable precision and support internal decision-making. This example also highlights the need for ongoing discussion and refinement of industry-accepted assumptions as contemporary literature leads to changing guidance over time.

This paper is one within the series of applications of the impact-weighted accounts product framework across each GICS sector, covering pharmaceuticals in the healthcare services sector. Ultimately, the aspiration is to develop and provide this framework to enable more informed decisions through accounting for the relevant impacts created by products.