HIGHER GROUND?

Report 2: Climate resilience and fashion's costs of adaptation

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Cover photo credit: Pok Rie, Pexels, Canva

Introduction

The fashion industry faces sustainability challenges in its current form. Growth has been fuelled by consumer spending rising twice as quickly as the global economy over the last decade. This has been delivered through business models designed to promote ever-shorter cycles of consumption and disposal, while cutting costs and suppressing wages across value chains. Apparel production is also responsible for between 5 percent and 10 percent of global carbon emissions[1] and heavily relies on oil-based synthetic materials for 60 percent of the clothes it produces[2]. With revenues equal to 2–3 percent of global GDP and responsible for employing a similar share of the world's workforce[3], the fashion industry plays a critical economic and social role.

Concerns over environmental challenges and human rights from regulators, investors, media, unions, and consumers have begun to drive changes in brand behavior.[4] The consequence of this is that brands and retailers have developed climate change mitigation efforts that are focused on increasing the use of recycled products, reducing water usage and cutting down greenhouse gas emissions. Not only do these efforts fail to reconcile the challenges associated with relentless increases in overconsumption, but they ignore the imperative associated with climate adaptation.

Our first report addresses the economic and social costs that result from acute heat stress and flooding—two of the major climate-related impacts that affect suppliers and, most importantly, apparel workers. We mapped fashion's climate vulnerabilities across 32 centers of production, calculated the potential export earnings foregone and jobs not created, and provided an overview of the governance and adaptive strategies available, particularly at a national and global level.

In this second report we dig deeper into what these scenarios mean for the largest fashion brands and retailers. How are brands likely to fare in the face of climate breakdown without any adaptation response? How large are the costs of climate-related disruption and who is likely to bear their burden? Are the major brands—whose scale and influence upstream make for commensurately large real-world impacts—pivoting to incorporate adaptation in their strategic planning? And finally, for those brands that do embrace more than just mitigation, what are the potential returns on adaptation investment?

In order to answer these questions, we map the supply chain footprint of six global apparel brands across four focus production centers: Dhaka (Bangladesh), Ho Chi Minh (Vietnam), Karachi (Pakistan) and Phnom Penh (Cambodia). We find that, for one of our focus brands, one-eighth of its suppliers and their workers in these cities will experience 30.5°C and higher wet-bulb globe temperatures (WBGT) for over 100 days in 2050. Meanwhile our flood analysis suggests risks from routine flooding are more isolated, but can still impact up to four percent of supplier factories.

We then provide an analysis of the potential value at risk caused by 'productivity headwinds'—i.e. factors that decrease productivity—associated with these climate impacts. To take one example, our work suggests these costs could amount to as much as three percent of sourcing spend for a focus brand in just one of these production centers, as early as 2030. In a value chain which has historically operated on very tight margins, these significant costs raise concerns around who is absorbing them.

We set out a framework, comprised of a suite of factors and metrics, for analysing whether brands may be more pre-disposed to pushing these cost pressures onto their suppliers and thereby onto workers. A bottom-up analysis of brand scenario planning indicates that these crucial actors are aware of the impending disruption to their supply chains. But based on interviews with buyers, suppliers and workers for this report, brands seem to be doing very little proactively to help insulate suppliers and their workers through tangible adaptation.

Finally, we assess the role of regulators when it comes to anticipating the costs borne by stakeholders and provide a suite of recommendations for all industry participants to deliver just resilience.

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1 Estimates for this range across sources, with the UNEP suggesting the fashion industry is responsible for up to 10 percent of global carbon emissions.

2 The European Environment Agency estimates synthetic fibers such as polyester and nylon make up about 60% of clothing and 70% of household textiles.

3 Ellen MacArthur Foundation states that the clothing industry employees more than 300 million people globally.

4 McKinsey research finds that 66 percent of consumers consider sustainability before purchasing products and around 88 percent want brands to be more eco-friendly. The Credit Suisse Sustainable Consumer Survey puts fashion at the intersection of two multiyear super trends – Climate change and Millennials' values. Almost 50 percent of Millennials and Gen-Zers consider the industry to be unsustainable, while only 25 percent of consumers in both developed and emerging markets say that environmental issues have not affected their purchase patterns.

Dhaka, Bangladesh 2004. Photo credit: Dougsme on Flickr.com

WHAT ARE CLIMATE SCENARIOS?

Throughout our analysis, we use climate scenarios known as Representative Concentration Pathways (RCP) and Shared Socioeconomic Pathways (SSP) along with climate change models that are part of the Coupled Model Intercomparison Project 6 (CMIP6) from the Intergovernmental Panel on Climate Change (IPCC). The pathways allow us to calculate how future climate scenarios—and the level of 'radiative forcing' or atmospheric warming that each one represents—may affect apparel production in 2030 and 2050 (Riahi et al., 2017).

SSP 1 Sustainability
Taking the green goad (Low challenges to mitigation and adaptation)

SSP 2 Middle of the road
(Medium challenges to mitigation and adaptation)

SSP 3 Regional rivalry
A rocky road (High challenges to mitigation and adaptation)

SSP 4 Inequality
A road rivided (Low challenges to mitigation, high challenges to adaptation)

SSP 5 Fossil-fueled development
Taking the highway (High challenges to mitigation, low challenges to adaptation)

For projections in our two reports, we use the 'middle-of-the-road' scenario SSP 2 or SSP 2-4.5—where 4.5 represents the level of radiative forcing in this scenario and the corresponding RCP 4.5: "The world follows a path in which social, economic, and technological trends do not shift markedly from historical patterns. Development and income growth proceeds unevenly, with some countries making relatively good progress while others fall short of expectations. Global and national institutions work toward but make slow progress in achieving sustainable development goals." (IPCC, 2007; Riahi et al., 2017). This pathway allows us to avoid both understating risk using the most optimistic SSP 1 or catastrophizing with the fossil-fuel intensive SSP 5 scenario. And stopping our analysis at 2050 means we largely avoid the greater uncertainty that accompanies longer-term projections.[1]

1 For more details and methodology, see IPCC, 2007, https://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf and O'Neill et al., 2014 https://link.springer.com/article/10.1007/s10584-013-0905-2.

PART 1.
HOW WILL BRANDS, SUPPLIERS AND WORKERS FARE IN THE FACE OF CLIMATE BREAKDOWN?

1.1 Introduction to the focus brands

In our first 'Higher Ground' report, we highlighted the extensive costs to national economies dependent on the apparel industry in the face of the physical risks of climate change—namely heat stress and flooding. It also highlighted the notable knock-on social costs to workers. This report drills down a layer to understand how these issues manifest at the brand and supplier level. In order to do this, we selected six focus brands to represent a wide variety of business models, outlined below.

Table 1. List of focus brand pseudonyms.

Focus Brand	Description
1	Value fast fashion
2	Value retailer
3	Fast fashion mid-multi retailer
4	Mid-market sportwear
5	Mid-market multi-retailer
6	Online only

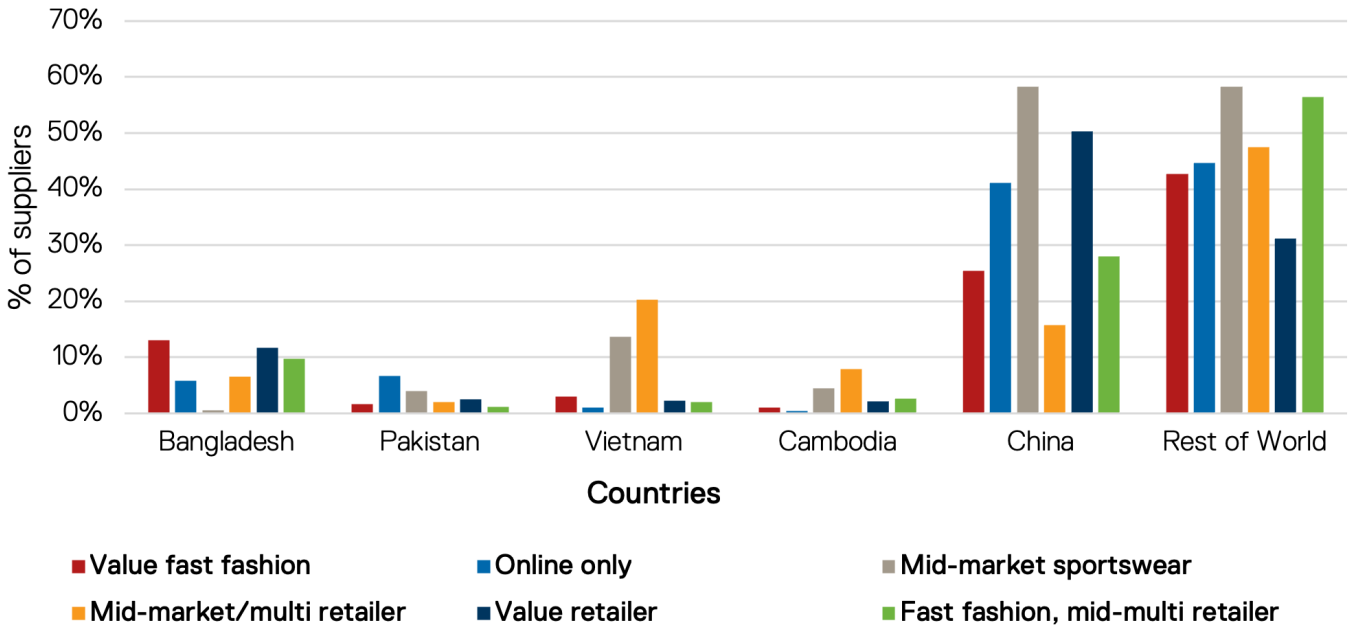
The six focus brands were also chosen for analysis due to the high concentration of their supply chain footprints within the four principal production centers analyzed in our first report: Dhaka (Bangladesh), Ho Chi Minh (Vietnam), Karachi (Pakistan) and Phnom Penh (Cambodia). The geography of the focus brands' supplier bases in these countries are outlined in the figures below, based on number of supplier factories in each location.[5]

In addition, we regard the six focus brands and their supply chains as roughly representative of the risks of fashion's business models and sourcing strategies. This set of six brands is obviously not comprehensively representative of the whole apparel industry, but in order to undertake in-depth and meaningful climate analysis we decided to hone in on a limited group.[6] One of our key assumptions is that large, publicly-traded brands are among the best-placed to take steps to address climate risks to workers.

5 Note that factory counts do not reflect sourcing volumes or value.

6 For more discussion, see Katalyst Initiative (2022). The tens of thousands of smaller brands that make up the rest of the global fashion industry will face exactly the same challenges but operate in a far more fragmented environment. Luxury production, likewise, is not part of this analysis.

Figure 1. Geographic footprint of focus brands' supply chains.



Source: Brand disclosures. Note: 'Value fast fashion' Bangladesh percentage of suppliers is an estimate based on a brand disclosure list modified to eliminate duplicate/related entries. Analysis undertaken July 2023.

1.2 Brand exposure to climate supply chain risks

The concentration of suppliers in different production centers, and the actual individual locations of those suppliers, will alter the risk profiles of any company's supply chain. Extreme heat will be felt in similar ways across a city or region, allowing for differences in building provisions for heat; but the impacts of flooding will vary widely across a city—some industrial neighbourhoods may be inundated while others stay dry. In order to tease out these differences, this section breaks down the different risks for our six focus brands across four production centres: Dhaka, Karachi, Ho Chi Minh City and Phnom Penh.

When it comes to extreme heat, the impacts on productivity are chronic and widespread. As noted in our first report, levels of occupational heat stress risk begin to increase significantly above 28 °C using the Wet Bulb Globe Temperature index. (ILO, 2023) Studies estimate that for every increase of 1 °C above 25 °C WBGT, productivity for moderate effort manufacturing work—this includes apparel production—decreases by an average of 1.5 percent. (Hsiang, 2010)[7] As an indicator of projected levels of significant heat stress for apparel workers across the four production centres, we take the threshold of 30.5 °C WBGT in the SSP 2-4.5 climate scenario used in the first report, and note the percentage of supplier factories exposed to days exceeding this temperature for each focus brand.

7 The academic literature includes several long-term studies measuring the effect of heat on labor productivity, including some conducted in apparel production in S. Asia. For a comparison of heat-productivity approaches and studies, see Somanathan et al (2021) at https://www.journals.uchicago.edu/doi/10.1086/713733#1st_rf7R. Our use of Hsiang (2012) and a 1 - 2 °C WBGT decline in manufacturing productivity per degree above 28 °C WBGT represents a conservative choice among the approaches.

Table 2. Extreme heat in production centres and focus brand supply chain exposure, 2030 and 2050.

Production Center	Timeline	Days exceeding 30.5C WBGT	Percent of Supplier Factories in Production Center					
			Value fast fashion	Online only	Mid-market sportswear	Mid-market multi retailer	Value retailer	Fast fashion, mid-multi retailer
Dhaka	2030	65	11.2%	4.9%	0.0%	5.8%	10.1%	8.8%
	2050	104						
Karachi	2030	190	1.2%	1.7%	0.0%	1.9%	0.9%	0.7%
	2050	203						
Ho Chi Minh City	2030	55	1.0%	0.2%	9.9%	6.7%	0.9%	0.0%
	2050	98						
Phnom Penh	2030	41	0.7%	0.4%	3.2%	7.2%	1.7%	2.3%
	2050	75						

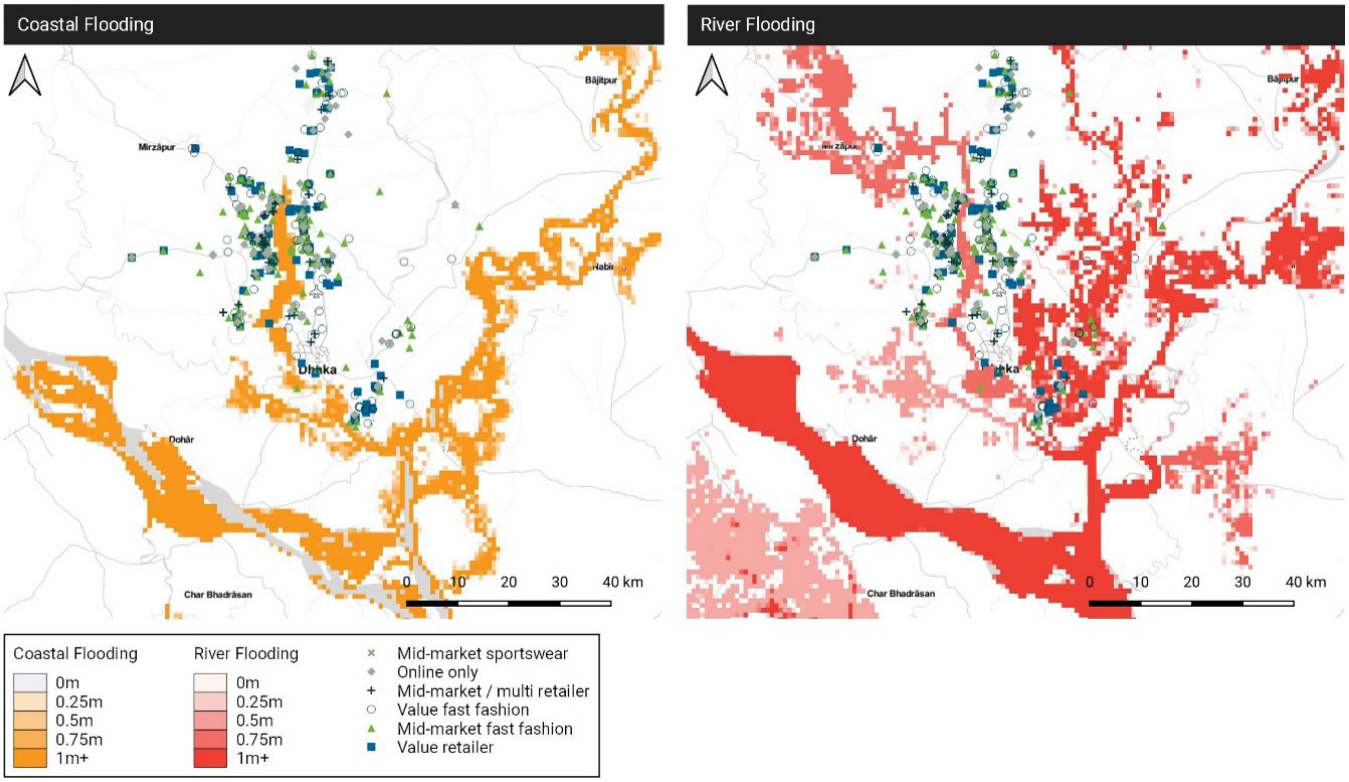
Sources: Schroders, Copernicus E.U.. Note that the timelines of 2030 and 2050 are the average of the decades 2030-2039 and 2050-2059. Analysis undertaken July 2023.

Workers and manufacturers for all six brands will face significant productivity impacts from extreme heat. No brands have significant production in Karachi but for two of the six, at least ten percent of their global factory counts are in the Dhaka region. Our ***Mid-market multi-retailer*** has the broadest representation across the four centers and—given their vulnerability to extreme heat—the highest risk.

Extreme heat productivity losses will be compounded by flooding. The following maps depict projected coastal and riverine flooding in 2030[8] within our four principal production centers. 'Using the middle-of-the-road climate scenario (RCP 4.5) and a ten-year flood return period, we overlayed flood projections with the production facilities of the suppliers of the six focus brands to determine exposure. As noted in our first report, production centers will be much more affected by riverine flooding than coastal flooding. In comparison to heat, flooding impacts on production vary more brand to brand. Our focus brands with significant production in Dhaka face the most dramatic physical flood impacts, whereas those in Karachi look to be less likely to be directly affected.

8 RP-10 Event, RCP 4.5 Climate Scenario.

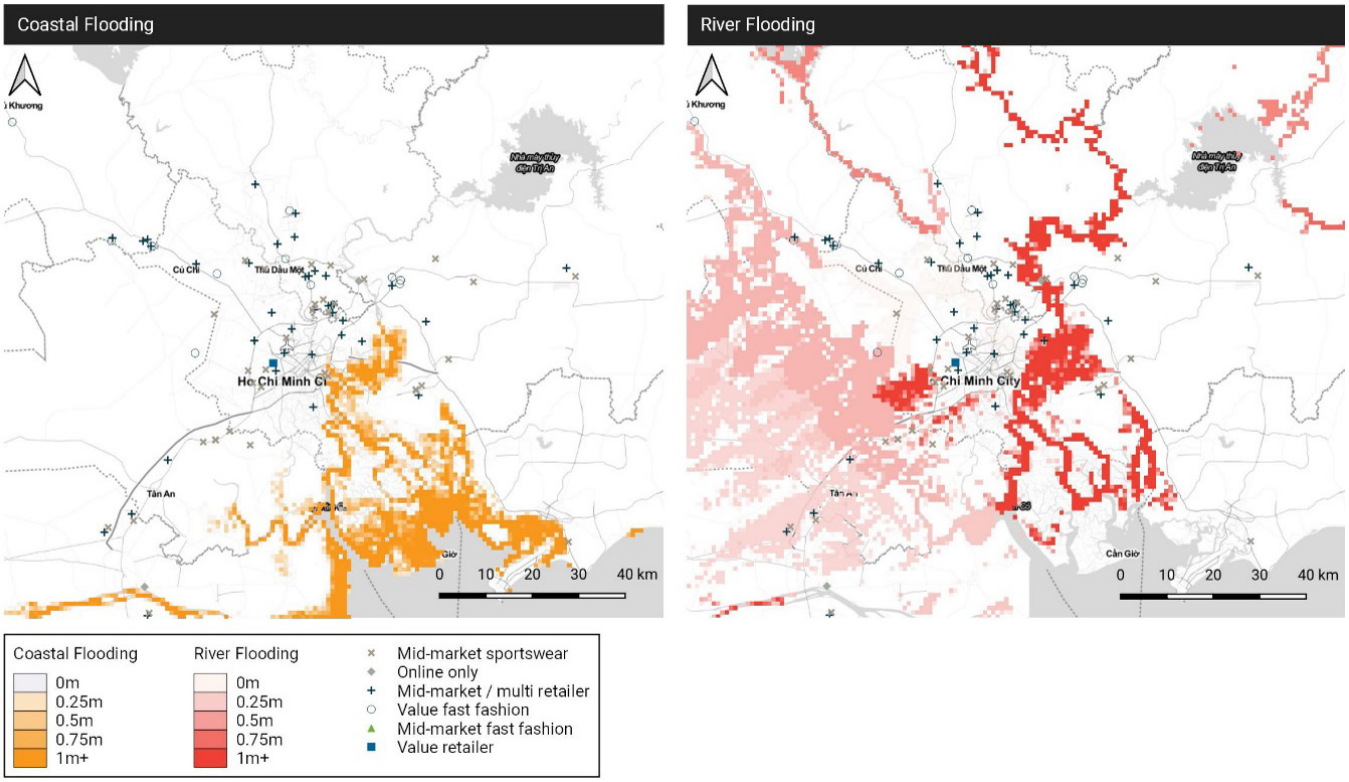
Figure 2: Brand exposure to Dhaka riverine and coastal flooding in 2030.



Sources: Schroders, WRI, Brand disclosures. Analysis undertaken July 2023.

Of the four centers, Dhaka is expected to be the worst hit by both coastal and riverine flooding for an RP-10 flood event in the RCP 4.5 Climate Change Scenario for 2030. Of our six focus brands, the ***Value retailer*** and ***Value fast fashion*** brands have over ten percent of supplier factory footprint within Dhaka. This implies that among our brands, the value-focused end of the market could be subject to the greatest flood-related disruptions. Where margins across the value chain may be tighter with such business models, and disruption therefore less tolerable, this either necessitates additional investment in adaptation, or could incentivize a shift in manufacturing to less flood- and heat-exposed parts of Bangladesh or to other production centers.

Figure 3. Brand exposure to Ho Chi Minh riverine and coastal flooding in 2030.

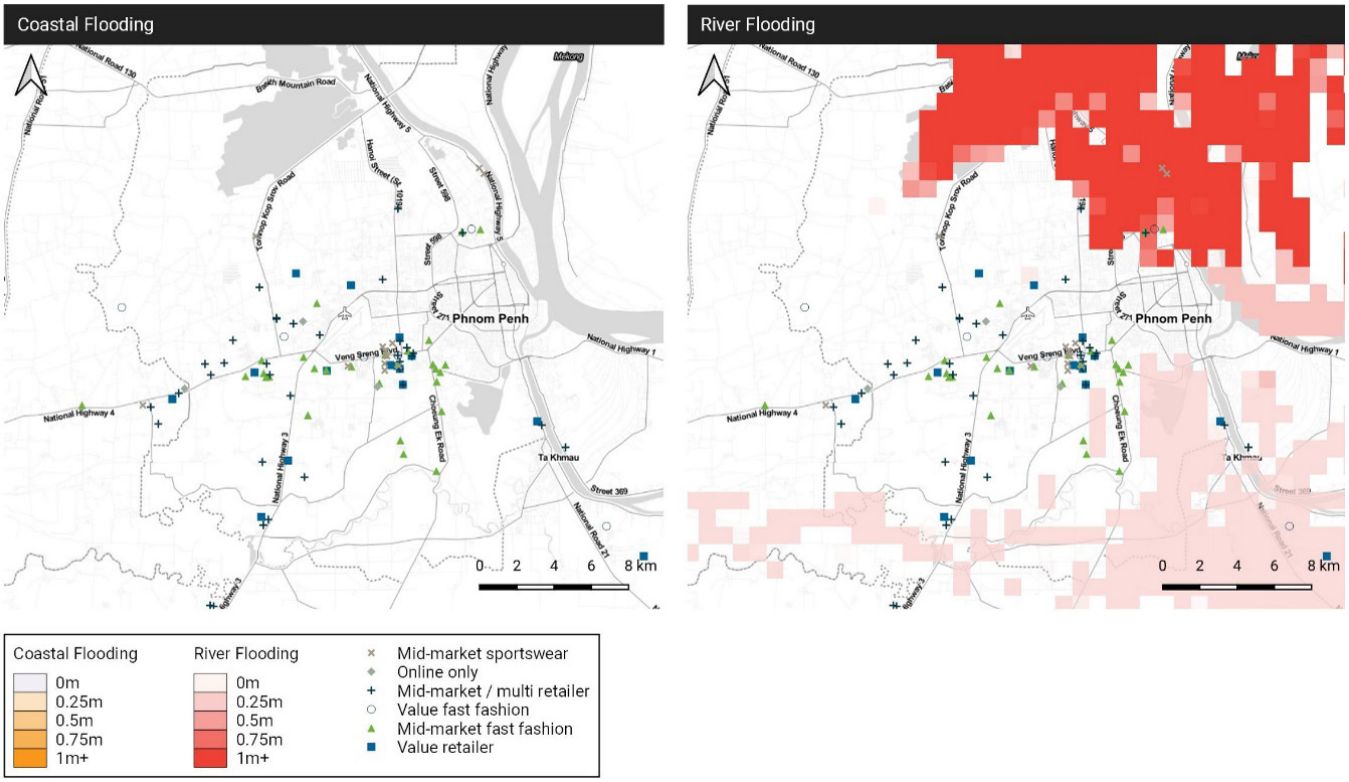


Sources: Schroders, Worldpop, WRI, Copernicus E.U. Analysis undertaken July 2023.

Ho Chi Minh is the center where the largest proportion of our individual brands' supplier locations are affected by riverine flooding in our chosen scenario. It also experiences relatively significant heat stress risk. Given Vietnam is known for sourcing higher-value and differentiated goods, such as footwear, it is unsurprising that our Mid-market sportswear and Mid-market/multi retailer brands have larger footprints here.

Per Figure 3 above, over a quarter of the facilities for our Mid-market sportswear brand are at risk of inundation in Ho Chi Minh in our primary scenario of RCP 4.5 and RP10—approximately 3.3 percent of its full supplier footprint. As noted above, these impact estimates cannot account for volumes or value of production affected. For brands that are highly dependent on Ho Chi Minh, such as those in sports footwear, supplier adaptation will be of particular importance.

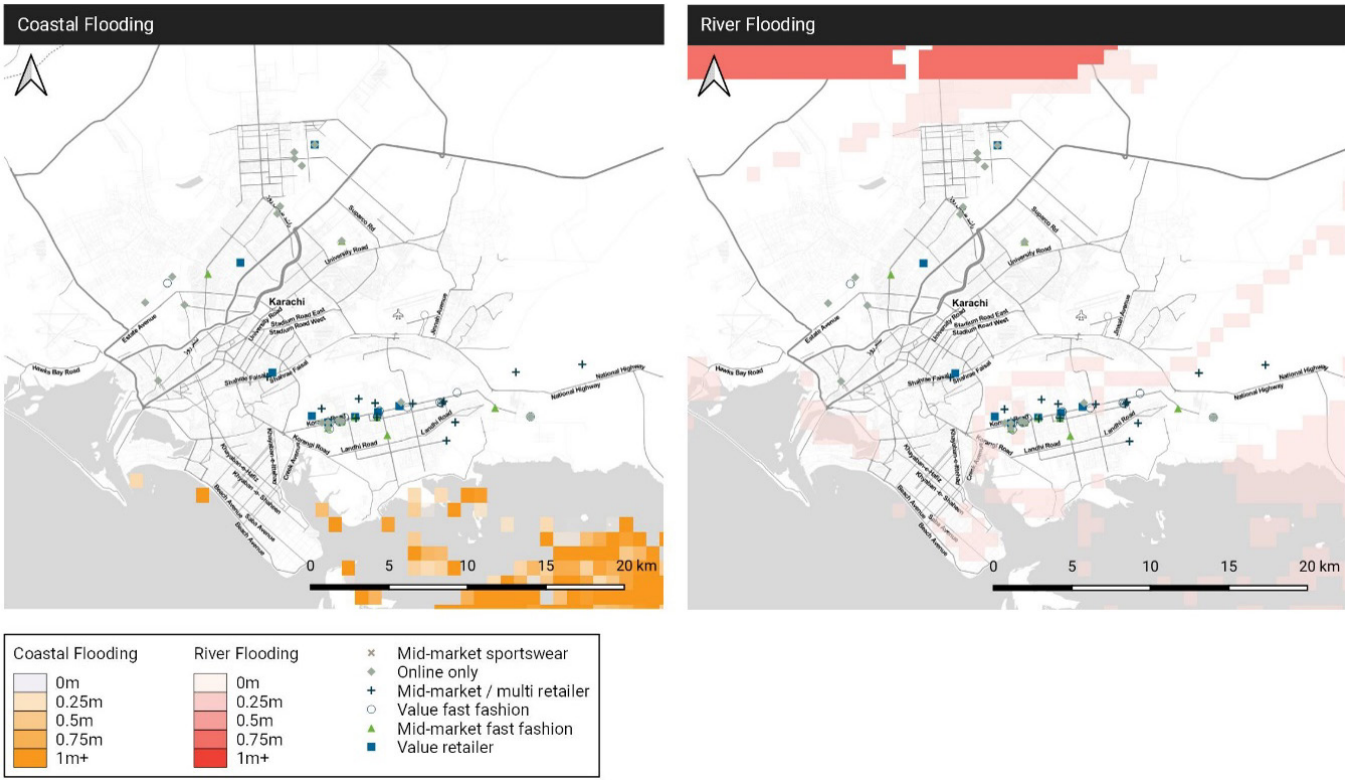
Figure 4. Brand exposure to Phnom Penh riverine and coastal flooding in 2030.



Sources: Schroders, Worldpop, WRI, Copernicus E.U. Analysis undertaken July 2023.

Phnom Penh is minimally affected by coastal flooding, but riverine flood risk remains pronounced—as detailed in our first report. There is broader exposure across all six focus brands to Phnom Penh, implying diversification in the kinds of goods produced in this centre. As a result, there is scope for disruption from flooding to a broad base of end buyers. Meanwhile, of our four focus centres, Phnom Penh is projected to have the fewest days annually exceeding the threshold of 30.5 °C WBGT in 2030 and 2050.

Figure 5. Brand exposure to Karachi riverine and coastal flooding in 2030.



Sources: Schroders, Worldpop, WRI, Copernicus E.U. Analysis undertaken July 2023.

Karachi appears to be the least affected by both riverine and coastal flooding. In the scenario highlighted, we do not identify any factories that will be impacted by coastal flooding and, out of the 67 factories for our six focus brands, only one factory is impacted at one meter or more of riverine flooding. However, Karachi is expected to experience a notable hike in heat stress—the hardest hit out of the four focus production centres—so physical risk for manufacturers, workers and brands there remains high.

So how do these impacts of flooding and heat stress stack up for our brands? A summary of the above is outlined in Tables 3 and 4.

Table 3. Summary of brand exposure to heat and flooding in 2030 and 2050.

Focus Brand	Production center	Number of factories in production center	% of total factory footprint in production center	2030			2050		
				% of factories in region affected by riverine flooding	% of factories in region affected by coastal flooding	Average days exceeding 30.5 °C	% of factories in region affected by riverine flooding	% of factories in region affected by coastal flooding	Average days exceeding 30.5 °C
Value fast fashion	Dhaka	146	11.23%	11%	1%	65	11%	2%	104
	Ho Chi Minh	13	1.00%	15%	0%	55	15%	0%	98
	Karachi	15	1.15%	0%	0%	190	0%	0%	203
	Phnom Penh	9	0.69%	18%	0%	41	18%	0%	75
Value retailer	Dhaka	89	10.08%	11%	1%	65	12%	3%	104
	Ho Chi Minh	8	0.91%	14%	0%	55	29%	0%	98
	Karachi	8	0.91%	0%	0%	190	0%	0%	203
	Phnom Penh	15	1.70%	6%	0%	41	6%	0%	75
Fast fashion mid-multi retailer	Dhaka	158	8.75%	11%	5%	65	10%	7%	104
	Ho Chi Minh	0	0.00%	-	-	-	-	-	-
	Karachi	12	0.66%	0%	0%	190	0%	0%	203
	Phnom Penh	42	2.33%	12%	0%	41	12%	0%	75
Mid-market sportswear	Dhaka	0	0.00%	-	-	-	-	-	-
	Ho Chi Minh	40	9.93%	24%	2%	55	27%	5%	98
	Karachi	0	0.00%	-	-	-	-	-	-
	Phnom Penh	13	3.23%	21%	0%	41	21%	0%	75
Mid-market multi retailer	Dhaka	40	5.79%	2%	2%	65	5%	2%	104
	Ho Chi Minh	46	6.66%	15%	0%	55	18%	0%	98
	Karachi	13	1.88%	8%	0%	190	8%	0%	203
	Phnom Penh	50	7.24%	2%	0%	41	4%	0%	75
Online only	Dhaka	54	4.91%	6%	0%	65	6%	2%	104
	Ho Chi Minh	2	0.18%	50%	0%	55	50%	0%	98
	Karachi	19	1.73%	0%	0%	190	0%	0%	203
	Phnom Penh	4	0.36%	0%	0%	41	0%	0%	75

Sources: Schroders, Worldpop, WRI, Copernicus E.U. Flooding based on RP-10 Event, RCP 4.5 Climate Scenario in 2050. Heat stress based on WBGT in SSP2-4.5, in 2030-2039 and 2050-2059.[9] For each brand, we have highlighted the most striking exposure to climate risks across heat and flooding. Analysis undertaken July 2023.

9 Note that one cannot aggregate number of factories flooded in riverine and coastal scenarios, because these represent discrete model outputs. Nevertheless, it is appropriate to conclude that riverine flooding represents a much greater impact in the relevant climate scenarios.

Table 4. Overarching flood and heat impacts for brands in focus production centers, 2030 and 2050.

Focus Brand	2030		2050	
	% of total factories affected by over 100 days exceeding 30.5°C in focus production centres	% of total factories impacted by flooding in focus production centres	% of total factories affected by over 100 days exceeding 30.5°C in focus production centres	% of total factories impacted by flooding in focus production centres
Value fast fashion	1.2%	1.7%	12.4%	1.7%
Value retailer	0.9%	1.5%	11.0%	2.0%
Fast fashion mid-multi retailer	0.7%	1.7%	9.4%	1.7%
Mid-market sportwear	0.0%	3.4%	0.0%	3.8%
Mid-market multi retailer	1.9%	1.6%	7.7%	2.0%
Online only	1.7%	0.4%	6.6%	0.5%

Sources: Schroders, Worldpop, WRI, Copernicus E.U. Flooding based on RP-10 Event, RCP 4.5 Climate Scenario in 2050. Heat stress based on WBGT in SSP 2-4.5, in 2030-2039 and 2050-2059. Analysis undertaken July 2023.

Pausing to reflect on the analysis presented above, we can make a couple of observations. The effects of heat become meaningfully worse, according to our analysis, between 2030 and 2050. Per Table 3 above, workers manufacturing goods for our focus brands face a sevenfold increase in exposure to extreme heat in these production centers, on average, between 2030 and 2050.

Flooding risk increases more gradually, however, and is generally a smaller, more isolated issue. The picture here is largely consistent with the findings presented in our first report. As we will show, the consequences that these exposures could yield, in terms of value-at-risk or productivity headwinds, are potentially meaningful to brands and suppliers. And they have additional consequences for workers that depend on how their employers and buyers react. While the pervasive and large scale effects of heat make it a systemically important subject for adaptation, the unpredictability of flooding means it is a potentially idiosyncratic cost, with severe impacts on individual suppliers and their workers, and therefore on brands and their investors.

SAFE HARBORS

In addition to analyzing the likely flooding of apparel factories themselves, it is important to anticipate further disruption for brands caused by the flooding of ports and surrounding infrastructure, such as bridges, roads and warehouses. Ports are the gateway to smooth transportation of goods around the world. If affected by climate impacts, brands will likely experience delays from factory to end customer.

For example, an April 2022 storm and flood at the Port of Durban—the largest container port in southern Africa—inundated the routes to the port, turning over trucks and containers. The port was disrupted for two weeks after flooding caused by 12 inches (30.5 cm) of rain in 24 hours, a deluge consistent with a 100-year rainfall event. (XX)

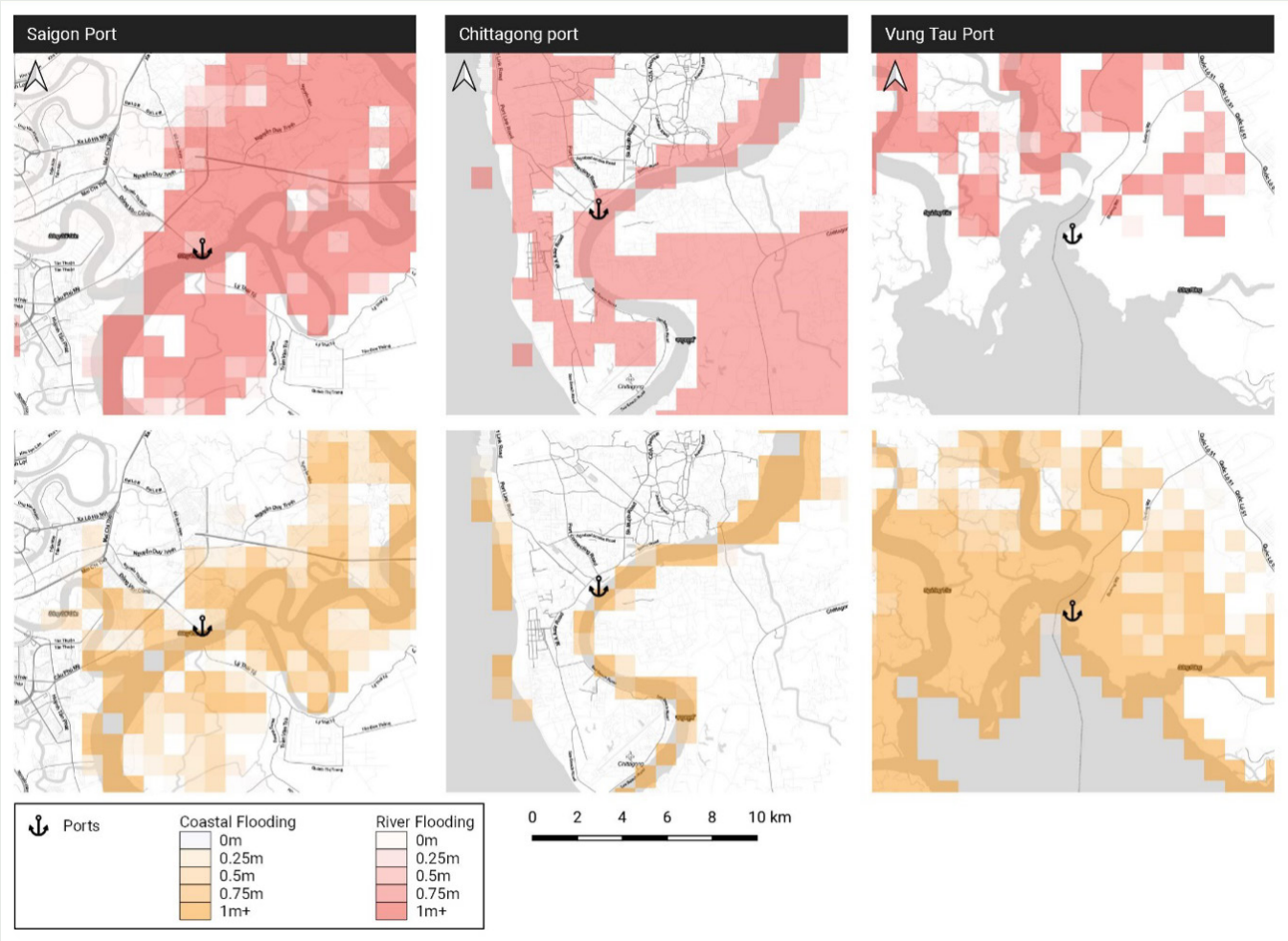
Supply chains were interrupted by the suspension of outbound and inbound shipping during this period. Damage to the fixed infrastructure just beyond the immediate harbor—flooded roads and highways, and collapsed bridges—was another reason for

shipping delays. Estimates to repair the damaged road infrastructure ran to ZAR 5.6 billion (USD 259 million) and in the harbor, a backlog of 8,000 to 9,000 containers meant processing delays of weeks following the floods.

Weeks later, in a very different part of the world, a two-meter-high tidal flood inundated the coastal area of Semarang City, Indonesia, in May 2022. The Tanjung Emas Port was flooded for three days following a tidal wave caused by increased rainfall and storm surge, and the collapse of an embankment near the port. Nineteen factories and nearly 14,000 workers employed around the port—many of them apparel workers—were affected with some forced to stop production and evacuate. (XX)

To anticipate such impacts to ports, for this report, we analyizd the outputs of coastal and riverine flood models for the main ports in the four focus countries surveyed here to provide a high-level view of flooding vulnerability in Figure 6 below. Of the five ports, Vung Tao and Saigon—southern Vietnam's main sea and river ports—face significant risks in 2030. Bangladesh's main seaport at Chattogram (Chittagong) will see both coastal and riverine flooding of 0.75 m. and more.

Figure 6. **Projected flooding for most affected ports in focus production centers, 2030.**



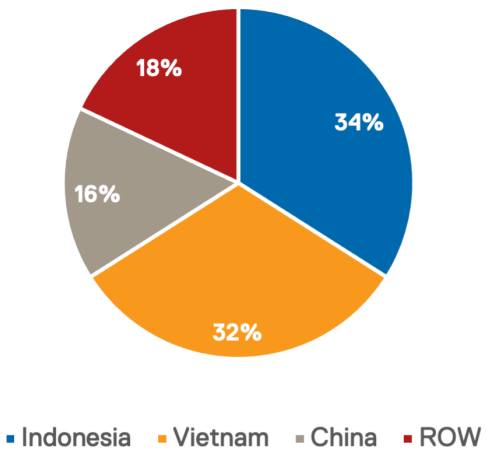
Sources: Schroders, Worldpop, WRI, Copernicus E.U. Flooding based on RP-10 Event, RCP 4.5 Climate Scenario in 2030. Analysis undertaken July 2023.

PART 2.
WHAT IS THE VALUE-AT-RISK FOR THESE BRANDS?

The natural question which exposed companies and their investors will ask off the back of these findings is, 'What will I lose?' or 'How can I estimate the costs of this?' Using a similar approach to our first report, this section looks at the value at risk for one of our focus brands based on its disclosure of sourcing volumes by country. We have had to make assumptions here, so note that this is an indicative illustration of how to think about the value at risk as a result of supply chain vulnerability to climate change. The illustration that follows seeks to present the potential consequences of flood and heat impacts for brands or their suppliers in terms that can be considered proportionate either to the Cost of Goods Sold (COGS) and operating profits of a brand, or revenues of a supplier. While the individual brands' growth rates between now and 2030 will vary, the methodology that we have applied to scaling the value at risk is built on the number of interruption days presented either by heat or flooding in 2030. These can then be scaled accordingly either to brand COGS[10], or supplier revenues to imply headwinds either in percentage (common size) or absolute terms.

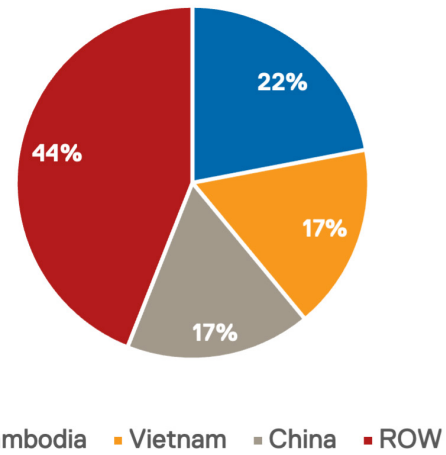
Some key sourcing facts about our brand are set out below.

Figure 7. Proportion of apparel sourcing by country.



Source: Focus Brand Annual Report 2022.

Figure 8. Proportion of footwear sourcing by country.



Source: Focus Brand Annual Report 2022.

To be clear, this worked example needs to be considered in the context of the value chain. Roughly speaking, our sample company operates at 50 percent gross margins, and 10 percent operating margins through the cycle. Suppliers in the industry tend to run with operating margins of between 5 and 10 percent. If our brand were to face an unmitigated cost of say 1 or 2 percent of total COGS, that would equate 5 – 10 percent of operating profits given the margin structure referred to above. Looked at from the opposite end, however, 1 – 2 percent of a brand's COGS represents the same portion of a supplier's revenue. Should a brand seek to pass the burden up to a supplier running at only 5 percent

10 Note here the distinction between COGS, which include cost of garments, freight, agency fees and duties, and FOB, which is the cost specifically of garments "free on board". FOB is a term widely used in the fashion industry and typically determines the point at which a buyer becomes liable for the goods being transported, oftentimes at the factory gate. We have used reference to COGS through this section, as this is the line item that sits at the intersection of brands and suppliers, is critical to brand economics and, to a large extent, dictates the earnings power of those brands over time – in turn holding the key to unlocking a brand's likely propensity to support suppliers in their efforts to adapt to the physical effects of climate change.

operating margins, that supplier's capacity to bear the additional costs is limited by already low profitability, potentially creating systemic risk for either the supplier itself or its workers[11].

2.1 Sample brand's productivity headwind associated with apparel and footwear production in Ho Chi Minh

We have first looked at how apparel and footwear production in Ho Chi Minh could be affected by flooding and heat stress in 2030.

We estimate that EUR 2,771 million[12] was spent by this firm in 2022 on inventory from Vietnam. Given that our focus brand is sourcing from 55 factories within Vietnam, and making the assumption that all factories are of an equal size, that implies circa EUR 170,000 is spent in each factory per working day (assuming 297 working days).

As with our first report, we focus on the value lost to coastal and riverine flooding in the 2030 RP10 scenario, and estimate the disruption days of our brand's supplier factories between 0 - 0.5m, 0.5 - 1m and 1m+ of flooding. We estimate three days of recovery for flooding between 0 - 0.5m, 6 days for 0.5-1m and 12 days for 1m+ of flooding.

Taken together, we anticipate that by 2030 there could be roughly 56 days of interruption caused by RP10 flooding across the brand's Ho Chi Minh supplier factories alone.[13] Based on our assumed daily factory spend, this translates to EUR 9.5 million over the course of a year; equivalent to 0.34 percent of our estimate for this brand's total sourcing spend in Vietnam in 2022.

In the case of heat stress, we look first to determine the productivity loss associated with days exceeding certain thresholds of WBGT. The ILO has stated that levels of occupational heat stress begin to become an issue at 28 °C (ILO, 2023). Taking the previously cited study which finds for every 1 °C rise in WBGT, there is an average 1.5 percent decrease in productivity (Hsiang, 2010), we are able to calculate productivity losses on days where temperatures are above certain WBGT thresholds, based on the difference in degrees between the 28 °C limit. Simply speaking, we assume a 1.5 percent productivity dampener on days where temperatures are in the 28-29 °C band, for example, 3.7 percent for the 29-30.5 °C band and so on.

11 It is important to flag that over time, if the frequency of extreme flooding and heat events rises, there will be incremental costs over and above what we present in this worked example. Given we believe that these costs are not yet sufficiently understood in the current context of the sourcing debate, we have not sought to disaggregate potential incremental changes to these over time.

12 In our calculation of the COGS by country we have made two important assumptions. First, per conversations with industry experts we have assumed that apparel gross margins in this instance approximate to 55 percent, while footwear gross margins are circa 47 percent. Second, we have used the proportionate country volume disclosures from the brand in question to be equivalent also in value terms. In other words, our assumption is that the value of sourcing spend mirrors the volume of production by country that is displayed in the charts above. Note that euros are used here as this is the reporting currency of the focus brand.

13 The analysis we have run suggests that of the total number of supplier factories for this brand in Ho Chi Minh city, 11 of them are flooded under this scenario.

Table 5. Productivity headwind associated with heat stress for apparel and footwear production in Ho Chi Minh for sample Brand in 2030 scenario.

Number of days with temperatures... (#)	Between 28 – 30.5 WBGT	238
	Between 30.5 - 32 WBGT	52
	Between 32 - 35 WBGT	3
Amount spent in Ho Chi Minh on days with temperatures... (EUR million)	Between 28 – 30.5 WBGT	1,616
	Between 30.5 - 32 WBGT	351
	Between 32 - 35 WBGT	24
Cost waste associated with days with temperatures... (EUR million)	Between 28 – 30.5 WBGT	48
	Between 30.5 - 32 WBGT	21
	Between 32 - 35 WBGT	2
Sum of productivity headwind (EUR million)		71

Sources: Schroders, Brand 2022 Annual Report. Note: figures have been rounded. Analysis undertaken July 2023.

When aggregated, the productivity headwind from heat loss in Ho Chi Minh can be expressed as 2.57 percent of this brand's Vietnamese COGS[14]. This is a greater estimated figure than that caused by flood risk, echoing the analyses laid out in Report 1. Heat stress is a chronic and ongoing dampener on productivity, whereas flooding is more infrequent but can be less predictable and disruptive in the extreme. We have not taken any measures to adjust the productivity headwind according to the extent to which adaptation measures exist within the supplier factories.[15]

2.2 Sample brand's productivity headwind associated with footwear production in Phnom Penh

We explored a second case study, using the same approach as in Ho Chi Minh, but focused on the physical risk impacts on footwear production in Phnom Penh, given that Cambodia is the principal sourcing country for this company's footwear goods.

We estimate that EUR 865 million was spent in 2022 on footwear inventory from Cambodia. Given that our focus brand sources from 18 factories within Cambodia, our analysis assumes that approximately EUR 166,000 is spent in each factory per working day. Using the same methodology for projecting the number of adjusted flood interruption days in Phnom Penh, we find there are 35 days' worth of interruption in the 2030 RP10 scenario, which results in EUR 5.6 million worth of potential loss, or roughly 0.65 percent of Cambodian footwear COGS.

Looking to heat stress, the days above certain WBGT thresholds in Phnom Penh and subsequent productivity losses are laid out in Table 6 below. The estimated productivity headwind of heat stress—EUR 18.75 million—can be expressed as 2.2 percent of Cambodian footwear COGS.

14 It is important to note here that we are referring to percentage of COGS and not the percentage of cost FOB, or 'free on board'. The latter represents the apparel price standard, but comes before a range of additional costs that are born by brands: freight, agency fees, customs duties and so on. While it is therefore a lower proportionate effect than it would be as a percentage of FOB, we use COGS here for the sake of commonality in investment language and understanding.

15 There is a dataset produced by University Notre Dame Global Adaptation Initiative which ranks countries based on climate preparedness, which could be used as a factor in calculating value at risk. In our analysis, we have assessed the potential value at risk both adjusted for preparedness and without adjustment. For the purposes of this illustration we present the damage caused without preparedness adjustment, given the heterogeneity of adaptation measures within factories for heat and flood.

Table 6. Productivity headwind associated with heat stress for footwear production in Phnom Penh for sample Brand in 2030 scenario.

Number of days with temperatures… (#)	Between 28 – 30.5 WBGT	225
	Between 30.5 - 32 WBGT	39
	Between 32 - 35 WBGT	2
Amount spent in PHNM on days with temperatures… (EUR million)	Between 28 – 30.5 WBGT	472
	Between 30.5 - 32 WBGT	82
	Between 32 - 35 WBGT	5
Cost waste associated with days with temperatures… (EUR million)	Between 28 – 30.5 WBGTs	13
	Between 30.5 - 32 WBGT	5
	Between 32 - 35 WBGT	1
Sum of productivity headwind (EUR million)		19

Sources: Schroders, Brand 2022 Annual Report. Note that figures have been rounded. Analysis undertaken July 2023.

Taken in aggregate, this worked example implies the stacked costs of heat stress and flooding on 2030 apparel and footwear production for this particular brand across Ho Chi Minh and Phnom Penh could approximate to EUR 105 million.

There are several ways to think about this in context, but we suggest that it is most important to consider its relative importance. For starters, this figure equates to circa 3 percent of the value of COGS in the two countries we have assessed. It approximates to 1 percent of the brand's total cost of goods. But referring back to the margin structure we highlighted at the start of this section, 1 percent of total cost of goods is 0.5 percent of revenues—an important number for a business that earns only a 10 percent operating margin through the cycle. In other words, this alone could represent at least 5 percent of operating profits.

One should note, however, that this does not take into account other additional physical risk impacts in production centres outside of Ho Chi Minh and Phnom Penh. Referring back to table 1 of our first report, which presents a summary of heat and flood projections across an array of additional production, it is plausible that related productivity headwinds may be playing out across our sample brand's other production centers in a similar manner[16].

In addition, this flood analysis only focuses on relatively mild occurrences within a ten-year return period. Second, the inundation levels we model are associated with only one flood event per factory per year, for each return period. So we are not including lesser, or indeed more chronic floods in the analysis. Third, the methodology above speaks only to the productivity related impacts of the lost days—the operational loss—and does not factor in the damage function on plant, equipment and buildings.

For brands and retailers operating on competitive margin profiles, with limited cushion for absorbing productivity burden or excess costs, these climate-related challenges could pose a meaningful headwind; and from an investor perspective, the value of getting it right is important if the effects are felt to the tune of 5 percent or more of operating profits, and compound over time. This is true of estimates for large brands that book out entire factories and thus are on the hook to pay workers regardless of the disruption caused by heat or flooding, and for brands who expect these costs to be absorbed exclusively by suppliers.

16 Of the additional production hubs that our first report identifies, heat and flood risk in China, and flood risk in Indonesia particularly could add to the burden of productivity costs being weathered by our sample brand.

Table 7. Summary of climate risk costs in Ho Chi Minh and Phnom Penh for sample brand.

HCM flood cost (EUR million)	9.5
HCM heat cost (EUR million)	71
PNM flood cost (EUR million)	5.6
PNM heat cost (EUR million)	19
Total cost (EUR million)	105
Cost as % of brand regional COGS	3%
Cost as % of brand NOPAT	5%

Sources: Schroders, Brand 2022 Annual Report. Analysis undertaken July 2023.

A FLOOD VALUE-AT-RISK CASE STUDY — INTENSEL

Throughout this work we have engaged with Intensel, a Hong-Kong based climate risk analytics firm. Taking the approach used by Intensel and applying it to specific facilities with detailed bottom-up assessment of the buildings in question, it becomes obvious that value at risk due to flooding could be meaningfully higher than our analysis presented above.

For this case study, Intensel analyzed a range of apparel and footwear facilities linked to one of our focus brands in the Mekong River delta region of southern Vietnam. High resolution simulations of storm surges and riverine and rainfall flooding allow close-in estimates of factory-by-factory costs that occur in different climate scenarios. The results for different factories can vary meaningfully even when sites are located just a few hundred meters apart, and crucially, this case study work revealed that flood damage can be indiscriminate. For example, LEED certification did not prevent one facility with more than 5,000 workers built near the banks of the Saigon River from significant inundation in Intensel's modelling, both in the SSP 2-4.5 (middle of the road) scenario and the more aggressive SSP 5-8.5. Put another way, sustainable certifications cannot be considered catch-all by stakeholders.

While the model revealed a maximum 2.83 meters of inundation for the affected factories under SSP 5-8.5, and only 1 meter under SSP 2-4.5, the calculations for value at risk were significantly closer together than these might imply. Using Intensel's estimates for the value of buildings as well as discharge and recovery rates—all of these being elements that can affect the damage function associated with a particular flood event—and assuming no resilience and no insurance cover, the potential baseline loss across ten facilities modelled in depth came to USD 341m by 2030 in the SSP 5-8.5 scenario, rising to USD 587m by 2050 (with 2.83 meters of inundation). Comparable potential losses under the SSP 2-4.5 scenario (1 meter inundation) are modelled to be circa 29 percent lower, at USD 465m by 2050.

The numbers described here are considerably larger than our base-line assumptions because they include assessments of the capital cost of the plant as well as estimates for the carrying value of the contents per building, among others. The other important takeaway here pertains to the shape of the damage curve. While the depth of a flood in an extreme scenario is 2.8x higher than a more moderate event, the value at risk is only 41 percent higher. In other words, the damage

curve flattens at higher levels of flood, such that the incremental value at risk is lower as we move past a certain base level of inundation[17].

This is an important point in the context of adaptation planning. Our conversations with industry practitioners, including a long-time sourcing director in Asia, as well as our evaluation of the climate scenario analyses conducted for brands—presented below—suggest flooding is considered to be an intangible and thus harder to plan for.

Meanwhile, the shape of the damage curve described above implies that the incremental benefits of adaptation—measured in terms of reduced value at risk—could quite possibly fall in line with the change in damage curve. In other words, adaptation[18] against say a 1 meter flood could carry a significantly higher return on investment (ROI) than adaptation against a 2.8 meter flood, because much of the value destruction takes place at the lower inundation level. This not only creates a complexity in the adaptation debate, but it creates elevated risk of stranded assets if brands consider the risks of larger floods altogether too intangible to prepare for or adapt to. This raises the question of whether suppliers would be better off moving to less-affected areas, and how this would affect workers, retention of skilled workforces and recruitment. We discuss this further section 'Future: To adapt or not adapt' below.

17 We note there is plenty of literature that speaks both to the shape of damage curves and the length of business interruption that ensues, whether while waiting for waters to discharge, or then in the recovery, clean up and or rebuild phase that follows. See here for examples of how to think about this: https://www.fema.gov/sites/default/files/documents/fema_hazus-flood-model-technical-manual-5-1.pdf

18 See our adaptation chapter for further discussion of this. Examples of adaptation planning and investment include (but are not limited to): climate-sensitive planning (and enforcement), improved drainage in industrial areas and factory-level flood defenses.

Given that these kinds of costs to suppliers, their workers, and consequently brands, are potentially on the line within the next five years and beyond, companies and investors need to consider the dynamics and distribution of value across the supply chain. Who is currently, or likely bearing this cost burden? Moreover, industry actors should contemplate what measures can be enacted to alleviate these headwinds—i.e. what is the return on investment in adapting factories to minimize the effects of extreme heat and flooding? In Part 3, we explore this question in more depth.

PART 3.
PAST, PRESENT AND FUTURE: ADAPTATION IN ACTION

The exposures mapped above show that the challenges associated with extreme heat and flooding are meaningful, whether born by suppliers and their workers, or the brands themselves. While our research into exposures, industry dynamics, and the attitudes of those with boots on the ground points to a range of answers to the question, 'Who pays?', this section of the report sets out how to think about and measure the costs and benefits of adaptation.

In order to contextualize the risks to supply chain stakeholders and brands—be they financial, reputational or a combination—we structure this discussion according to the past, present and future of the apparel industry's sourcing, production and business models.

- Past: we consider the history of the growth, relationships and economics that have characterized this value chain to date, including how growth and operational performance indicators (KPI) have historically been the dominant feature in buyer-supplier relations, with sustainability considerations only being recently added to the agenda.
- Present: we assess the range of approaches currently being taken across the industry, both by way of a broad sustainability performance analysis that assesses companies across a range of material sustainability topics—supplier facing and beyond—and through a bottom-up look at the sustainability disclosures of our six focus brands.
- Future: we set out how brands and investors might think about the return on investment (ROI) of adaptation, the steps that might lead to a decision to invest in adaptation, and the possible consequences associated with inaction, or full-scale relocation of suppliers, whether through near- or re-shoring.

3.1 Past: Analysing historic apparel industry dynamics

The brands and retailers with more sophisticated purchasing practices have long been able to arbitrage different suppliers and opportunities. The core considerations in the buying equation have tended to be price, certainty, speed to market and volume. It is well documented that brand sustainable sourcing efforts have evolved over the last decade, but price, certainty and volume remain critical to buyers, and much of sustainability falls into 'compliance' (Bhandari et al, 2022).

The brand-to-supplier axis is extraordinarily complex. Ordinarily, brands have different tranches of supplier. As larger, reputation-sensitive brands describe it: strategic production partners are maintained for circa 80 percent to 90 percent of volume. A large value or mid-market retailer brand may have just a handful—low single digit number—of vendors who act as such strategic partners, meaning these relationships are of high value to both sides. Rapid consolidation in their sourcing bases both before and since the COVID-19 pandemic has deepened ties and mutual dependence between major brands and their largest manufacturers (Judd et al, 2021).

Brands report that they maintain a range of contractors for surplus manufacturing. These suppliers may account for up to 10 percent of volume, acting as the go-to source of capacity upside. And finally, as we understand it, some brands may maintain an additional cohort of suppliers for fast lead-time replenishments. This structure has ensured flexibility for brands and their most important suppliers, working in their favour as the industry has grown.

A growth machine—capacity flex

As fashion has grown over the last 20 years, the supply chain's expansion in Asia has exported disinflation to consumers, subsidized brand margins, produced seemingly limitless upside in capacity and facilitated practices that could by all accounts occasionally be uneconomic—unlimited free delivery, for online orders, for example. Proof points for this are plentiful, most recently evidenced by one UK-based online retailer (not among our focus brands) calling out six percent of its customer base as being responsible for economic losses that in 2022 equated to more than the average annual operating income generated by the entire business over each of the last five years.

Since the turn of the century, clothing sales have grown at approximately twice the rate of GDP, while the average time a garment is worn has fallen by almost a quarter. The emergence of new models has further challenged the sustainability of brand–supplier relationships, because the 'faster' the fashion, the shorter the production-consumption-disposal cycle (Figure 9). These characteristics have put pressure on the supply chain, but demand has always been met with supply.

Figure 9. Ever shorter fashion cycles

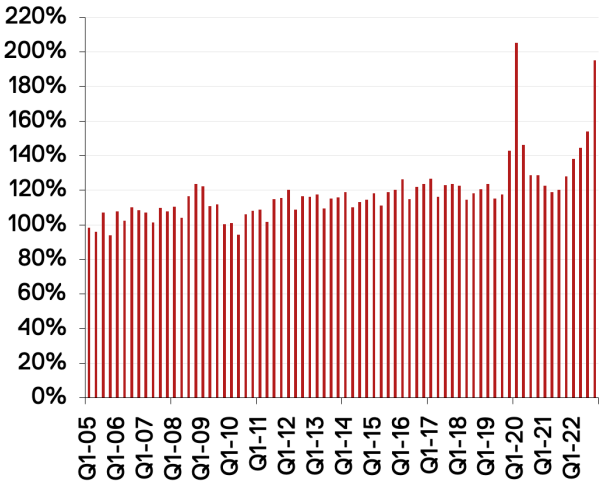
Source: McKinsey & Co.

The supply chain has historically been exceedingly responsive with capacity, dialling it either up or down with such flexibility that brand level inventory cover (i.e. number of days a business can cover sales with current stock) had shown remarkably little volatility up until the pandemic (see Figure 10 below). In fact, inventory cover has rarely been short for protracted periods of time over much of the last two decades, which is important context when we think about the directional relationship this has had with brand gross margins—per Figure 11. Greater flexibility in the supply chain is of benefit to brands, lessening the pressure on gross profit margins[19]. Ultimately, supply has reliably dealt with changes in demand.

19 This relationship tends to hold in the absence of extremes. Brands currently are awash with inventory. Our conversations with experts and analysts suggest that brands may have over-ordered on the way out of the pandemic, expecting not to be filled in full by suppliers. The result is inventory levels that are currently elevated.

Figure 10. Inventory cover across a range of sportswear brands

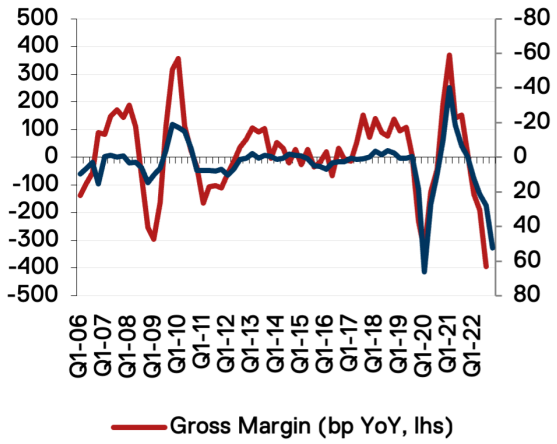
This plots percentage cover for period end inventories versus next quarter's COGS across a sample of brands.



Source: Redburn.

Figure 11. Inventory cover and gross margins

Chart plots the year on year change in inventory cover (inverted) along side change in brand gross margins.



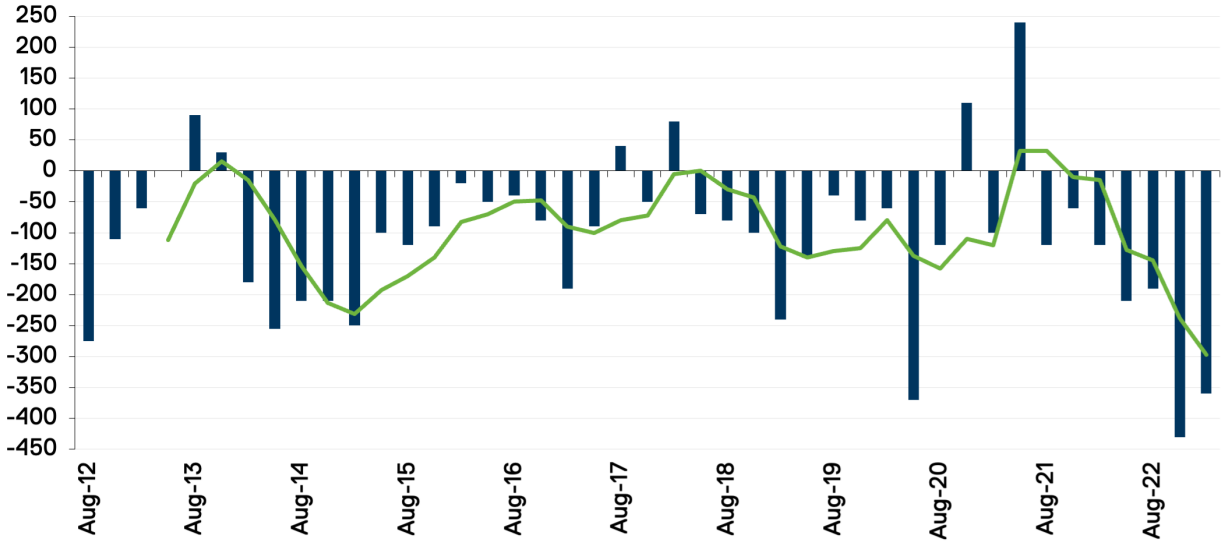
Source: Redburn.

The economic costs and benefits of this growth

Once a supply chain is established in an emerging economy, those downstream in the value chain—the brands—are then subject to the inflation present in that region. Per Figure 12 below, disclosures from one major player allow stakeholders to calculate the impacts that sourcing costs can have on brand gross margin. For most of the last ten years, sourcing costs have risen due to inflation, leading to a modest dampener through time to brand earnings, all else equal.

Figure 12. Sourcing cost effects on brand gross margin

Chart plots the year on year effects (in basis points) on one brand's gross margins, quarterly (blue) and moving average (green).

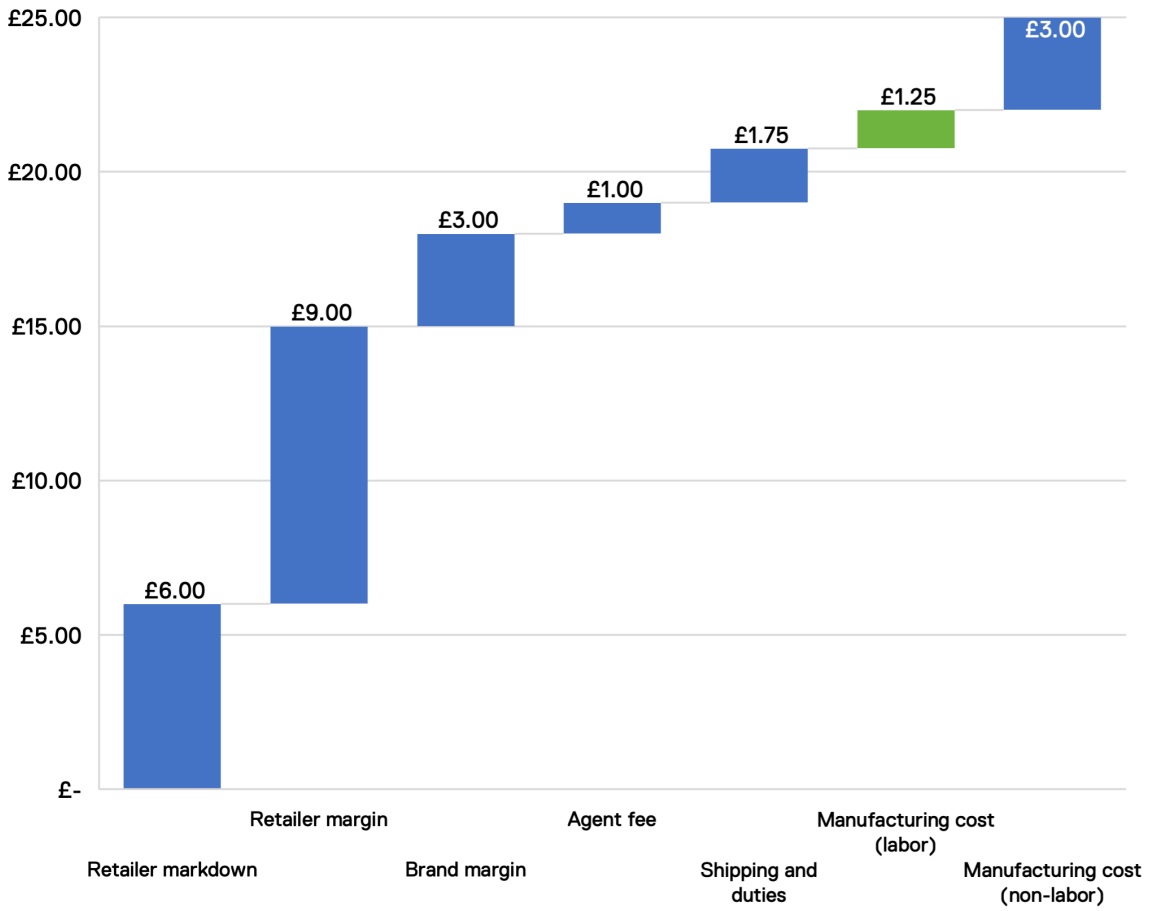


Source: Redburn.

Of the suite of moving parts that affects the COGS for brands—raw materials, labor, freight, currency fluctuations, agent fees and duties, among others—labor is significant. Generally, it can represent between 2 percent and 5 percent of retail prices, and approximately 20 percent of the COGS paid by a brand[20]. It is also one of the few areas where brands, or suppliers, can seek to generate leverage, or extract economic rent.

Figure 13. **Cost breakdown of a £25 t-shirt made in Asia with 60% sell through**

Within the manufacturing cost, we think labor approximates to 30%, with materials, overheads and supplier margins the remainder.



Sources: Schroders, Make it British. Note: The average manufacturing cost of a garment in the Asia is less than half that of a domestically made equivalent. While the cost of goods of relative to retail price is lower (17% for foreign sourced vs 35% for domestic), the savings made are offset elsewhere. Shipping and agency fees take their toll, but the consistent and oftentimes greatest challenge is markdown. The average sell-through (amount sold at full price) on fashion products is approximately 60%. For retailers who buy goods manufactured abroad, with 12 - 20 weeks (or more) of lead time, sell through can be lower if seasonal trends change. This can result in retailers making either no profit, or material losses, on 40% of more of the clothing they've ordered. This emphasizes the importance of scrutinising like for like gross margin changes, when seeking to understand both brand health and the quality of purchasing practices. When the pressure valve opens, does it get passed back up the supply chain?

20 There is a range of information on this, but the beyond our conversations with industry experts, we have paid particular attention to work done by the Fairwear Foundation, Clean Clothes Campaign and Public Eye. These sources speak to supplier labor equating to 2 – 5 percent, 3 percent and 4 percent of retail prices respectively, which when we work it back upwards with agency costs, shipping and duties would imply circa 20% of a brand cost of goods, and approximately 30% of manufacturing cost.

Over the last decade, we believe the supplier labor cost has risen modestly, with wages inflating mid-high single digits annually. As we understand it in the first half of 2023, however, like-for-like factory gate prices for one UK brand (not in our focus sample) were tracking -8 percent year on year, when adjusted for foreign exchange, the commodity basket and freight. This implies significant pressure on suppliers and potentially labor, as the value chain normalizes inventory levels while trying to limit damage to brand economics.

In the context of climate change, anticipated costs associated with inherent loss of productivity, absent proactive adaptation of factories to respond to heightened heat stress and flooding risks, will either eat into the value of manufacturing—including labor—or make companies operating in affected regions less cost competitive. As a result, we anticipate a scenario where the costs of manufacturing could be forced to rescale to accommodate climate impacts. We should be conscious that, if the accommodation of these costs is mismanaged, this could lead to wages being squeezed and workers becoming more vulnerable.

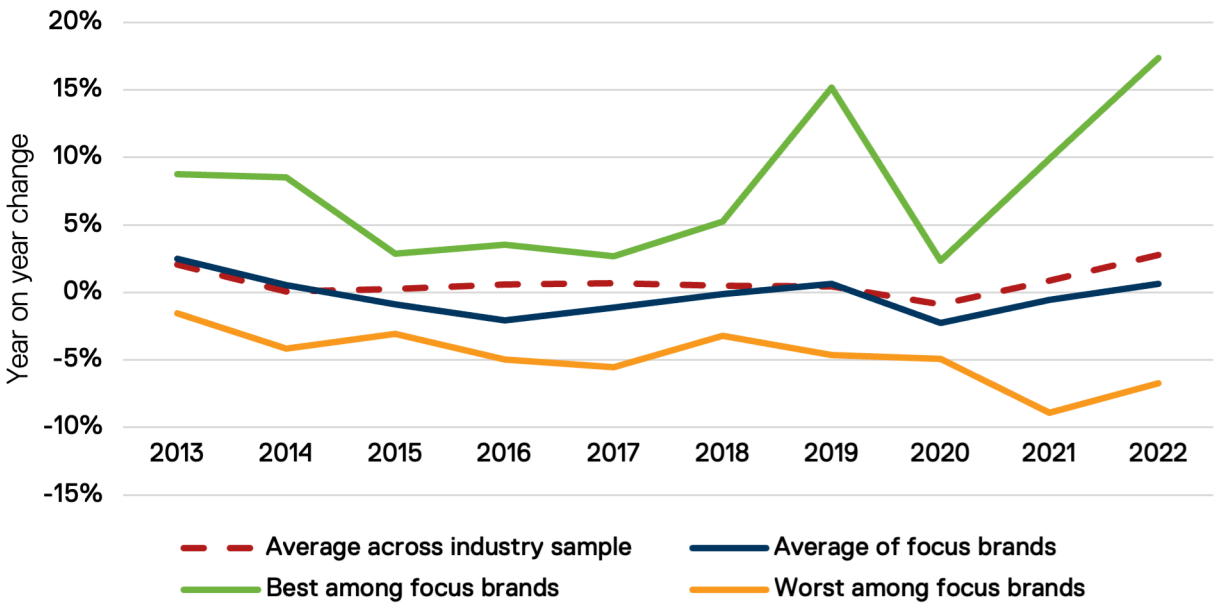
Assessing the balance of power in the relationships

From an outside perspective, there are few ways we can track the balance of power in the supplier to brand relationship, and there are equally limited numbers of outcomes KPIs that allow us to evaluate the effectiveness of brand responsible sourcing efforts. Understanding these points is important in helping us monitor actual supply chain or buyer risk, and pressure that brands may be applying to suppliers and their workers, either by necessity or by choice.

Plotting historic gross margins and their year-on-year changes for circa 60 global apparel and accessories brands and retailers, per Figure 14 below, shows that this part of the industry has seen its earnings power increase fractionally over time. Gross margins have risen at 0.8 percent compound annual growth rate (CAGR), on average. Meanwhile for our focus brands in Europe and the U.S., gross margin has been steady or slightly decreased over the last ten years. At brand level this might point to our larger focus firms at times needing to 'buy' revenue growth with markdown, or it might imply that supplier relationships are not consistently yielding what is required by brands competitive positions as they have scaled. Both could, at times, translate into pressure passed back up to brands.

Figure 14. Change in gross margin (year on year)

Chart plots the year on year best, worst and average changes in our brand gross margins, against the industry sample.

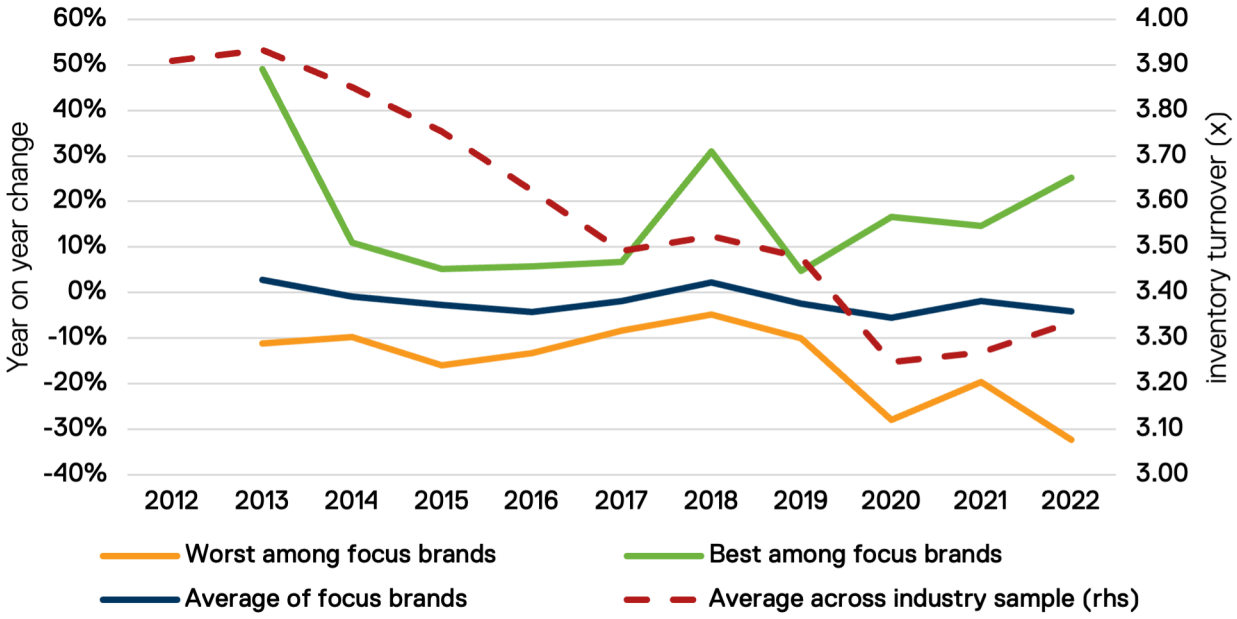


Sources: Schroders, Refinitiv.

Looking beyond gross margins, we can also consider working capital as one of the principal levers brands have at their disposal to affect cash flows. Inventory turnover for the same industry-wide sample of companies has fallen at an average CAGR of 1.6 percent per year, developing marginally worse among our six focus brands at -1.8 percent CAGR. This trend was in train before the COVID-19 pandemic. As inventory turnover falls, attention on purchasing practices should rise either because it could be a partial cause of inventory woes—i.e. poor judgement for sourcing volumes—or because it may be an area where brands seek excessive value—cancellations, last minute call-offs etc., which can have profound economic consequences on suppliers and their workers.

Figure 15. Change in inventory turnover (year on year)

Chart plots the year on year the best, worst and average changes in our brand inventory turnover, against progression of absolute inventory turn for the industry sample.

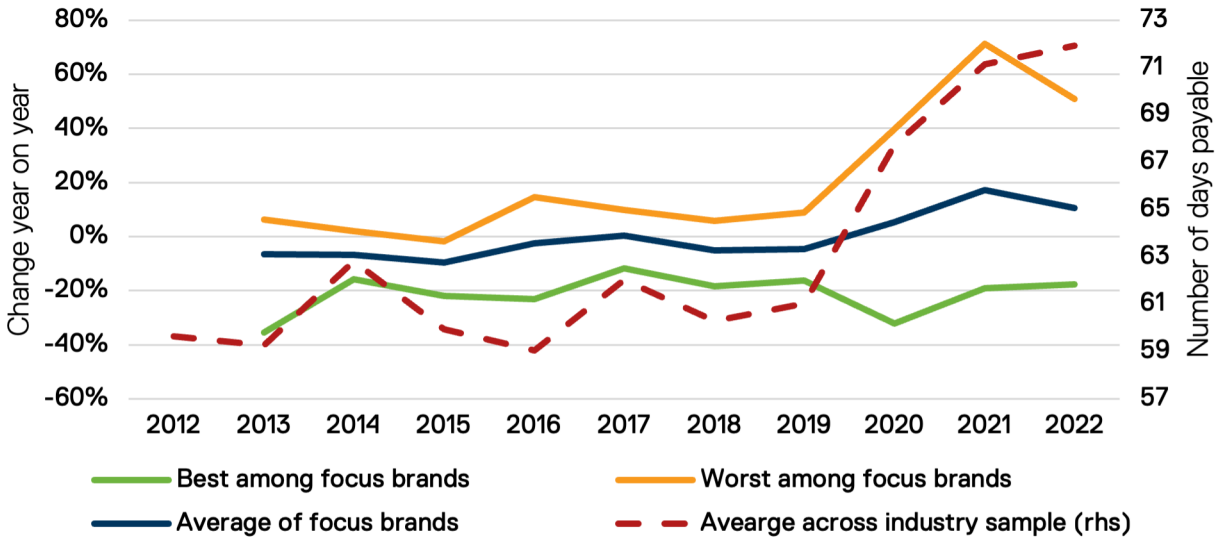


Sources: Schroders, Refinitiv.

Finally, we look to payables, another source of cash for struggling brands and retailers. Per Figure 16 below, we see yet again that the industry trend has been marginally less favorable for suppliers, even prior to the onset of the pandemic. Average days payable have risen across our industry sample at 2 percent CAGR, moving from 59 to 72 days over a decade, having risen mildly prior to the pandemic and then significantly during 2020 and 2021. This stands in stark contrast to our focus brands, however, where payables have been largely flat and even shortened at many firms.

Figure 16. Change in days payable (year on year)

Chart plots the year on year the best, worst and average changes (yoy) in our brand days payable, against progression of absolute days payable for the industry sample.



Sources: Schroders, Refinitiv.

None of these metrics in isolation gives us a view of the accuracy of purchasing practices, nor their fairness in terms of distributing economic power across the supply chain. But together they paint a picture of an industry set up that has consistently seen value accrue proportionately more towards the brands rather than suppliers. In the context of absorbing the costs associated with physical climate risk such as flooding and heat, we explore how these kinds of factors can manifest to elevate pressures in supply chains (and therefore likelihood of mistreating suppliers) in Part 3.3.

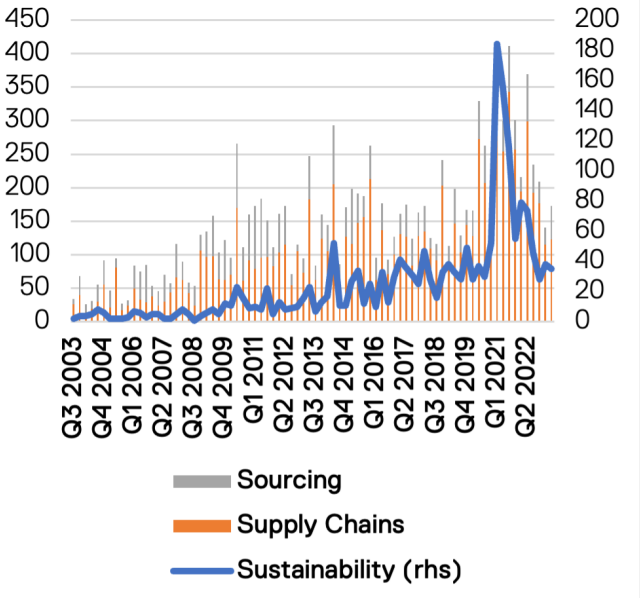
The history of sustainable sourcing

As the financial and growth dynamics referenced above have played out over the last 15 to 20 years, there has been a growth in focus around sustainability when it comes to the apparel value chain, and more broadly the economy. The Rana Plaza collapse in Bangladesh in 2013 is viewed by many as a major event that catalyzed attention and action on sustainability topics in the apparel industry.

Per the graphics below, taking the frequency of references to sustainability, supply chains, sourcing and sustainable sourcing on brand and retailer earnings calls as a crude proxy, we see that levels of attention paid to these topics has risen, in aggregate, over time. This is to say nothing of the nature of the commentary in question, but is illustrative nevertheless of the rising importance of these topics to company and investor stakeholders.

Figure 17. Increasing attention is paid to supply chains and sustainability

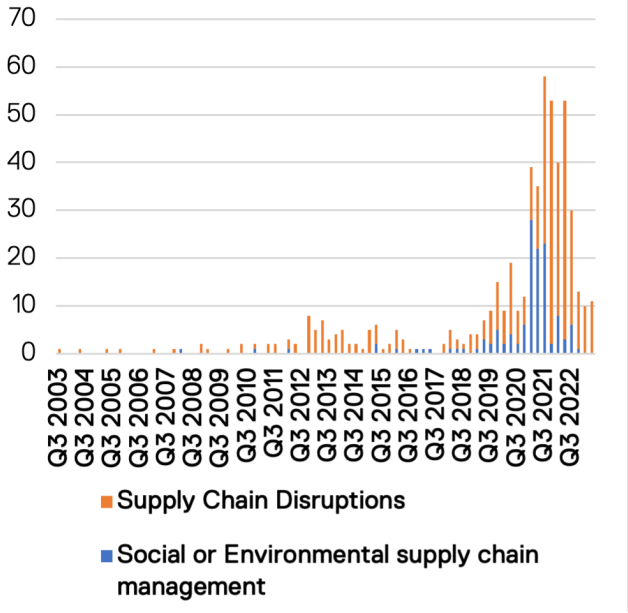
Chart shows number of references to these issues in quarterly earnings calls.



Source: Bloomberg.

Figure 18. Less attention is paid to disruption and social supply chain risk

Chart shows number of references to these issues in quarterly earnings calls.



Source: Bloomberg.

And yet, as already noted in our first report, the attention and effort from a sustainability perspective has been predominantly skewed toward climate mitigation, rather than climate adaptation to reduce impacts on suppliers and workers. The McKinsey & Co 2019 chief purchasing officer survey provides evidence of this. In response to the question: "what are the key sustainable apparel sourcing topics at the top of your agenda for the next 5 years?", worker-related topics are significantly overshadowed by climate change mitigation, and adaptation is altogether non-existent (McKinsey & Co, 2019).

Figure 19. Key focus topics for apparel sourcing executives

Size of the circle indicates relative percentage of respondents. N = 64.

Source: McKinsey & Co.

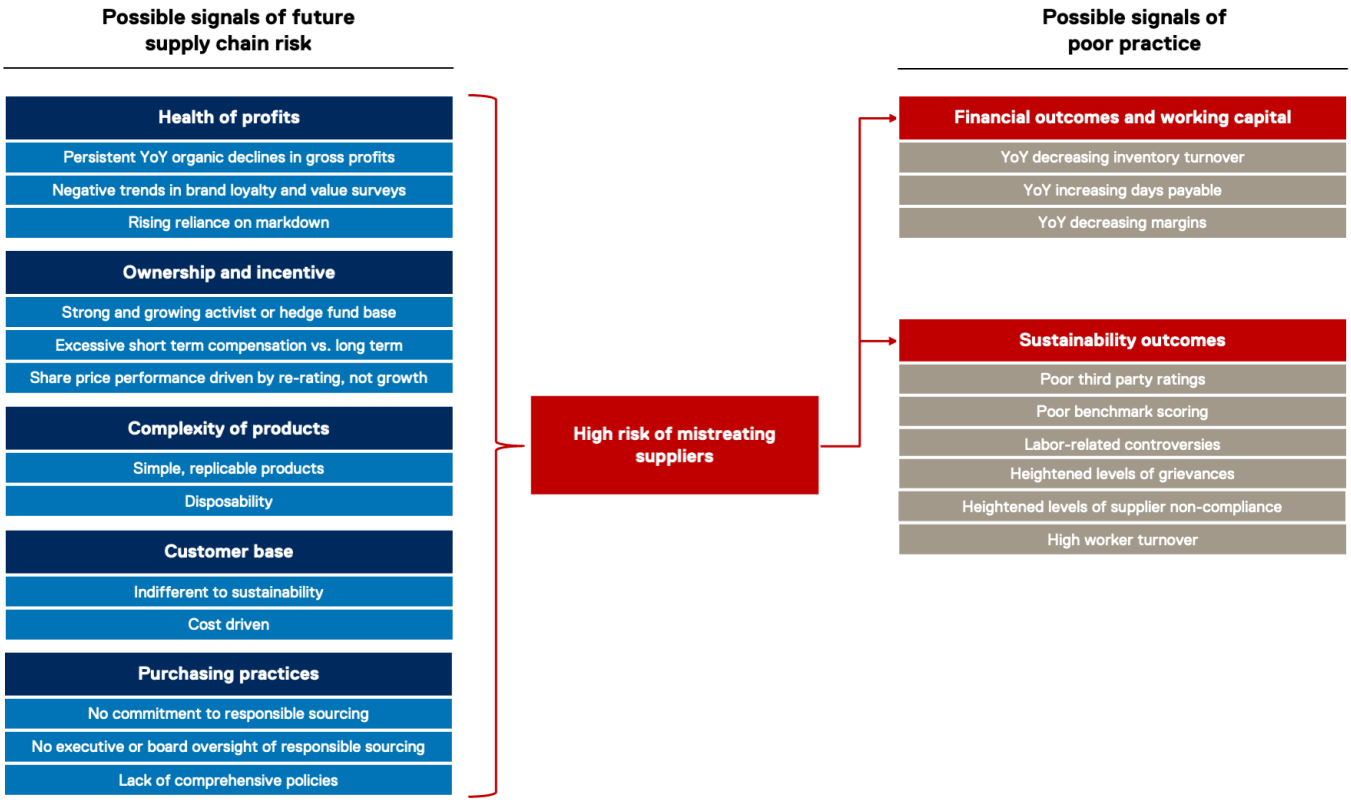
More recently, the rising focus on sustainability in the industry has led to a surge in the number of certification initiatives, some of which now wield significant influence over the industry. Testing and inspection companies have supported the use of these certifications, as demand for such labels has grown, largely from a compliance perspective. And all the while, the need for transparency as a first step towards creating accountability for sustainability related issues across the supply chain has led to the proliferation of firms reporting supplier data.

3.2 Present: Assessing sustainability performance today

As we anticipate incremental operational headwinds caused by impacts of climate breakdown, it is important to consider which brands are better placed to work with their suppliers to tackle these challenges vs. companies that are more likely to push the costs up the chain. Our conversations with industry experts and current views on how to think about this tension are summarized in Figure 20 below, identifying a variety of factors which could plausibly increase the likelihood of a company mistreating its suppliers, potentially leading to exacerbated pressures on workers.

Figure 20. Multi-stakeholder framework for risk of supply chain pressure.

Given the breadth of business models interacting with the garment industry supply chain, we have sought to present a general flow chart to represent the signposts investors and other stakeholders might consider as they assess the likelihood of brands supporting suppliers in adaptation or conversely, applying incremental pressure. Factors that are likely to increase risk of poor supply chain management are highlighted on the left hand side. These factors may result in outcome-related signals outlined on the right hand side.



Source: Schroders. Note: shown for illustrative purposes only and should not be interpreted as investment guidance.

The starting point is crucial. We advocate first assessing the health of company profits, and specifically changes in gross margins—which can summarize buying power, accuracy, brand health, and markdown, among others. This can be coupled with assessment of brand equity or resonance, through use of customer surveys. Next, we can build a view of whether firms would be incentivized to seek excessive value from suppliers by monitoring change in ownership, compensation structures and the drivers of share price performance—growth, or something else? Replicability and disposability of products, combined with customer surveys that shed light on the drivers of consumption can be considered next, before finally conducting a deep dive on the governance around procurement functions as well as the strength of sourcing policies and the suite of associated commitments.

Figure 21 applies the supply chain pressure framework outlined above to our six focus brands. We indicate more concerning performance on factors in a deeper shade of red. From a high level, there is a clear directional relationship between performance against the risk factors we identify and the outcomes. Those in the top half of the table below represent the brands that, through engagement, investors might seek to put particular focus on, when considering the supply chain exposures mapped above.

Figure 21. Supply chain pressure framework.

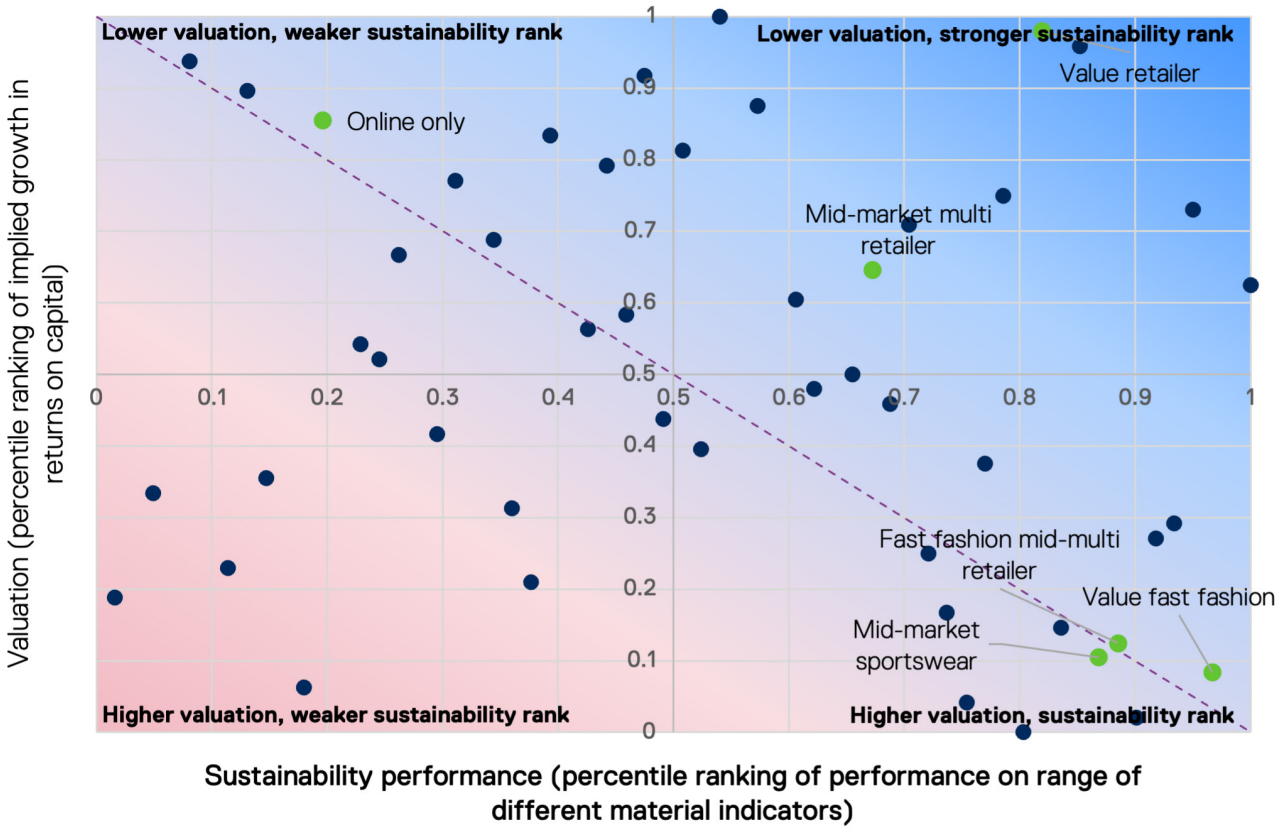
	Risk factors					Outcomes		
Brand	Health of Profits	Ownership and Incentive	Complexity of Products	Customer Base	Purchasing Practices	Financial Outcomes and Working Capital	Sustainability Outcomes	Valuation (multiple)
Value retailer								
Mid-multi market rtlr								
Online only								
Value fast fashion								
Mid-market sportswear								
Fast fashion, mid-multi rtlr								

Sources: Schroders. Note this is a combination of quantitative data and qualitative analysis. Shown for illustrative purposes only and should not be interpreted as investment guidance. Analysis undertaken July 2023.

Figure 22 then summarizes what this might look like if interpreted in an investment context. This comprises the sets of sustainability related outcomes—per the framework above—with a variety of other sustainability related metrics including human capital management, environmental management, social and supply chain management, and externalities, all set against valuation. While the two are not very highly correlated—which we would not yet anticipate to be the case given the breadth of the sustainability assessment represented here and the variety of approaches to sustainability that are taken across equity markets—we note there is, again, a directional relationship between sustainability performance and equity market valuations. As the market's appreciation of the materiality of sustainability topics evolves, and regulators require reporting of outcomes as opposed to broad measure of inputs and intentions, we would expect these relationships to consolidate.

The further to the right on the x-axis, the better the performance on these sustainability measures, relative to the industry as a whole. The y-axis meanwhile presents the equity market's view of the attractiveness of the firm, as determined by the implied growth in future returns on capital—essentially its valuation multiple—relative to the industry as a whole. Simplistically, the higher the expected growth in returns, the higher the valuation multiple placed on the company by markets, and the lower the dot on our y-axis.

Figure 22. Sustainability performance against valuation



Sources: Refinitiv, MSCI, CDP, Factset, Worldscope, Schroders. Note: the sustainability assessment represented here is an illustrative example of an approach that seeks to measure company performance relative to its industry, against (but not limited to) the following topics: commitment to sustainability, company human rights and supply chain focus, company human capital management, company management of climate risks, company management of cyber risk, and the value of externalities generated by the business as measured by the Schroders proprietary SustainEx™ model. Shown for illustrative purposes only and should not be interpreted as investment guidance. Analysis undertaken July 2023.

A striking inconsistency

It is important to acknowledge that the data and performance assessment summarized above is both only illustrative and confined largely to quantitative disclosures, which often orient around process and policy-based metrics rather than effective outcomes metrics. In addition, we undertook a bottom-up analysis of our focus brands' climate disclosures.

Even across our focus brands, there is a spread of quality and depth in reporting on physical climate risks. The Task Force on Climate-related Financial Disclosures (TCFD) has become a principal reporting framework for communicating risks and opportunities associated with climate change. Over the course of the last year or so, multiple countries including the UK, Switzerland and New Zealand, have introduced a TCFD reporting mandate for large companies. As a result, it has become a common parlance for international brands.

We reviewed our focus brand disclosures on climate and found that whilst most TCFD reports highlighted forthcoming risks associated with flooding and extreme heat in supply chains, there is then often a disconnect between this acknowledgement and outlined actions around how brands are measuring and evaluating such risks. In the most sophisticated reporting, companies may highlight a handful of measures to protect themselves from supply chain disruption linked to climate breakdown. For example, our 'Value retailer' highlights its ongoing sourcing strategy with a focus on geographical diversification to increase flexibility and agility when unexpected events occur. Similarly, our 'Fast

fashion mid-multi retailer' outlines how logistics centres have been configured to take on additional capacity in the case that storage and distribution of other facilities is disrupted by extreme weather events. Strikingly our 'Value fast fashion' brand states that in the case of suppliers in high-risk regions, contingency plans have been developed to shift production temporarily or permanently to alternative suppliers in lower risk regions. Even in the case where brands are addressing these risks, it is rarely spoken about through the lens of knock-on implications for workers.

It is seemingly rare to see any kind of mention of monitoring suppliers and worker implications around climate risks, or indeed supporting suppliers to adapt physical infrastructure in the face of extreme events. When it comes to supplier audits, there is often insufficient detail of the underlying components of assessments to understand whether extreme heat thresholds or flooding impacts are being recorded. One focus brand did state in its TCFD report that it will consider flood risk as part of its factory audit program going forward, aiming to work closely with its suppliers to mitigate flood risk. This should be the kind of measure we see more consistently across companies.

Table 8. **Focus brand reporting on physical risks and supply chain impacts.**

Company	Has a TCFD report	TCFD report identifies both heat and flood risks in supply chain	TCFD or risk management framework discusses specific climate scenarios	TCFD or risk management framework stress tests value at risk	Measures in place to minimize physical climate risks in supply chain	Supplier audits assess both heat and flood risks
Value fast fashion	Yes	No	Yes	No	Yes	No
Value retailer	Yes	Yes	Yes	No	Yes	No
Fast fashion mid-multi retailer	Yes	Yes	Yes	Yes	Yes	No
Mid-market sportwear	Yes	Yes	No	No	No	No
Mid-market multi-retailer	Yes	Yes	No	Yes	No	No
Online only	No	No	No	No	No	No

Sources: Schroders, Brand disclosures. Shown for illustrative purposes only and should not be interpreted as investment guidance. Analysis undertaken July 2023.

Given this juxtaposition of highlighted physical risks in supply chains and limited focus on the practicalities of addressing such risks, climate adaptation appears to be an underappreciated gap.

3.3 Future: to adapt or not to adapt

The conclusions of our mapping in the first chapter of this report suggest there could be meaningful productivity loss within brands' supply chains associated with the physical effects of climate change. This would therefore imply that unless the costs of adaptation are equal to the gain in productivity for suppliers—unlikely to be the case—climate-related risk is potentially likely to be added to decisions between suppliers when brands are making their selection.

In other words, when evaluating potential new suppliers, it is conceivable that brands will begin (if not already doing so) to consider price, certainty, volume *and* physical risk exposure or adaptation preparedness. This increases the emphasis for investors on responsible sourcing practices. If anchor suppliers are supported in their adaptation efforts but contractors and fast replenishment partners are not, does that risk undermining brands' sustainability efforts?[21] Moreover, does it threaten the fashion industry's existing model if adaptation efforts are not effective across the supply chain?

21 We would flag here that our mapping of supplier factory exposures in Dhaka was also run for formal facilities and informal facility locations, according to BGMEA data. It showed little by way of differentiation in the exposures between the two, meaning we would not expect the brands' supplier arbitrage to disproportionately favor formal or informal facilities as a result of integrating climate induced productivity loss into the equation.

When thinking about the acuteness of the need to adapt and the question of who pays, we have tried to frame the ROI of such activity as it might appear to both brands and suppliers. For workers who have been absorbing a large share of the costs of climate breakdown to date, the question is urgent and relatively uncomplicated.

We see four principal choices for brands and suppliers:

1. Take the hit to productivity from climate breakdown with no measures put in place;
2. Adapt current supplier facilities to lessen the impacts of heat and flooding for the benefit of all value chain stakeholders;
3. Move production sites to lesser affected regions within the existing sourcing countries; or
4. Move production sites to other countries which will be less impacted by the physical risks of climate change.

Using the numbers we identified as a guide in the value at risk section of this report—theoretical flood and heat related damage in Phnom Penh and Ho Chi Minh creating a productivity headwind of approximately one percent of COGS and five percent of NOPAT—it quickly becomes clear that this is a matter of systemic relevance for suppliers, with associated upside for brands.

Through interviews with apparel and construction experts within the Asia-Pacific region, we understand the cost of an all-new factory is in the range of USD 10m to USD 20m—for 10,000 square meters, inclusive of land, construction and machinery—and that a facility of this scale would be capable of delivering more than USD 30 million in annual revenue[22]. There are significant sensitivities at play here, such as variation in land costs from one of our production centers to the next; as well as notable challenges that industry participants have emphasized to us in terms of the challenges of sourcing labor that would likely occur when moving a facility even 30km away. However, taking the midpoint of these estimates—i.e. USD 15m for a new build factory—and a standard ten year payback period, it suggests a supplier would have to run at an average of a 5 percent NOPAT margin, before financing costs.

From a supplier's perspective, assuming the productivity headwind we identified earlier can be felt either in brand COGS or supplier revenues, the costs of the acute heat stress and flooding do not need to get much greater before the move to higher ground becomes too difficult to ignore. That is, improving factory working conditions—passive cooling technologies and paid sick leave, for example—to improve worker productivity can make investment in a new factory possible, even attractive to employers..

Meanwhile, were the costs of these productivity shortfalls currently to be falling fully on the shoulders of the brands—which we understand can be the case in certain buyer-supplier relationships where factory costs are effectively underwritten by the brands—the alleviation of headwinds that represent circa one half of one percent, or more, of sales, is a worthy prize. Supporting suppliers with the finance for adaptation, either in new facilities or with retrofitted flood defences and air-cooling systems, can have a positive consequence either through lower FOB costs, or greater certainty of supply.

Retrofitting for adaptation, as opposed to building new, is more complex but more likely, we expect, to be deployed against heat stress than flooding. This is due to the pervasiveness of heat compared to the idiosyncratic nature of flooding. Flood events, when they occur, can be costly and create sizeable interruption. But, despite increasing frequency, can still be looked at by some in the industry as one-off events.

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22 One individual from the Bangladesh Garment Manufacturers and Exporters Association recounted costs of USD 15 million to build and equip a 180,000 square foot factory outside of Dhaka in 2023. Another expert from the Institute of Architects in Bangladesh estimated the costs of building a new, green-certified apparel factory as USD 100-200 per square foot. Therefore, a 180,000 square foot factory at roughly USD 150 per square foot would come to USD 27 million.

POSSIBLE ADAPTATION MEASURES AVAILABLE TO SUPPLIERS

Through our research, we have consulted numerous industry participants, workers and experts.

We were particularly struck by one conversation with an industry buyer who noted, regarding heat stress, that additional air conditioning systems being deployed in factories was potentially unlikely, due in large part to the consequential increases in energy intensity and emissions, whose knock-on effect could negatively affect supplier ratings on third party surveys.

But we know from recent escalations of climate havoc from Hawaii to Ho Chi Minh that we cannot allow mitigation to trump adaptation. The industry's climate response requires more of both types of investments. So, what are some of the options?

On the subjects of adaptation and its costs we sought to identify the costs of retrofitting different solutions, as well as the costs of moving locations; the former potentially being less disruptive to workers in the end. Of note, our conversations have identified the following approaches and rough cost estimates, but we are very conscious that requirements in these situations can vary significantly from one building to the next, and so seeking to identify an ROI associated with each expenditure is challenged.

Adapting to heat:

Assessment and Design: while the cost of this in the context of the full-scale cost of adaptation is negligible, the consultation assessment and solutions design can cost USD 20,000 or more. This is the entry cost, before any work is subsequently carried out, much like an architect's consulting fee.

Cooling Systems Installation: installation costs are likely to depend on the type of cooling system chosen. While we flagged the challenges seen by some in the industry that are associated with HVAC systems, our range of sources suggested the cost can range from USD 5 to USD 15 per square foot of the factory space, to be followed by ongoing running costs. Other cooling options are available to suppliers and are in use in many instances already. These include evaporative coolers or ventilation. The installation cost of retrofitting AC can quickly become a multi-million dollar exercise for suppliers or factory owners.

Equipment and Materials: in addition to installation, the capital costs of the actual cooling equipment and materials can also come in the range of USD 5 to USD 15 per square foot. This can include air conditioning units, ventilation systems, fans, ductwork, insulation, and other components.

Electrical Upgrades: installing such equipment in a factory that previously did not have such systems, might also require significant electrical upgrades to handle the additional load. The cost of these can vary widely, but we understand could get into the low hundreds of thousands.

Additional Costs: finally, it's important to account for extra costs associated with labor, permits, project management fees, and contingencies. Again, these can range substantially, but we have received indications of between 10 percent and 20 percent of total project costs.

Adjustment of working hours: The hottest hours of the day can be avoided through the shifting of working hours. Note that whilst adjustment of working hours to accommodate peak heat hours may seem like a sensible solution, through our interviews, there is seemingly little precedent of this given different working cultures (e.g. in South East Asia, working hours tend to start later than other countries).

Adapting to floods:

Flood barriers: these are either temporary or permanent structures that prevent water from entering the building. In simple terms, think sandbags, but for more permanent prevention, these are flood walls or barriers than can cost up to USD 200 per linear foot.

Flood doors and flood ventilation systems: flood resistant doors and windows are especially designed to withstand the impacts of water. Flood ventilation systems are set up to allow water to flow through buildings rather than force it around them. They can help limit potential damage to building structures (which can become a

sizeable part of the value at risk), but they are more expensive than simple flood defences and can vary significantly from one system to another, pending the feasibility of design. We have been guided to circa USD 2,000 per vent.

Raised foundations: this sort of undertaking is substantial, but can be an effective form of flood defence. Possible costs run into the hundreds of thousands of dollars, and the disruption caused by the work likely makes this avenue unattractive.

Drainage: redirecting flood water is another alternative, that can be more cost efficient, but is replete with challenges as the broader infrastructure around specific buildings is likely to be affected.

What will national governments contribute to fashion industry adaptation? Adaptation at the national level is largely about government spending (and finance) for heat and flood measures: cooler streets, climate-proof planning (and enforcement), flood defences, and reliable and low-carbon energy sources among others. Our focus countries have outlined their annual adaptation and mitigation costs in Nationally Determined Contributions (NDCs) based on national climate pledges under the Paris Climate Agreements:

Bangladesh	USD 8.5 billion
Cambodia	USD 7.8 billion
Pakistan	USD 26.5 billion
Vietnam	USD 13.4 billion

The levels and financing for these resilience measures are not nailed down but include state budgets, lending and grants from international financial institutions and donors via a raft of funds including the Global Environment Facility (GEF), Climate Investment Funds, UN-REDD Readiness Program, and the Green Climate Fund (GCF).

In the face of the challenges we envisage from both flood and heat, it is likely that brands and suppliers themselves will be weighing up the cost of adapting existing production facilities vs. the cost of establishing new factories in potentially less impacted areas. Through our interviews, there is anecdotal evidence that apparel production is starting to build up capacity outside of the principal manufacturing hubs within our four focus countries. This is reportedly driven in part by demand for space and value of land, and it may also facilitate avoidance of riverine and coastal flooding, as well as island heat effects.

Finally, another theme raised in our conversations was the possibility of relocating production centres completely. As noted in our first report, public policy-makers and sourcing directors in the U.S. and E.U. are exploring the possibility of near-shoring more production, with European companies recentering toward Egypt, Turkey and other North African countries and U.S. production shifting to places like the Dominican Republic. Given the relatively lower levels of saturation in these markets, construction of production facilities may well be cheaper. This, combined with potentially lower physical risk impacts vs. Asia could make this an increasingly appealing option for brands. However, there are significant barriers for relocation—namely worker skill levels, workforce capacity, infrastructure capacity and supporting logistics. These will all incur cost. It is also not as simple as asking the question “stay or go”. Relocation can have profound consequences on workers that are left behind, in addition to the broader economies of these production centres.

After taking into account the significant potential costs and barriers to shifting production, climate adaptation in situ will likely seem more appealing. The return on investment in adaptation measures can be meaningful. However, before we get there, and in order to try and anticipate the answer to ‘where are the costs of adaptation likely to fall?’—the buyer or the supplier or the worker—we would expect the end brand to consider factors such as those outlined in Table 9.

Table 9. Adaptation or relocation?

Company Considerations	Factors that influence decision to support supplier to adapt
The affected supplier(s)	Length of relationship
	Provider of customized or unique products
	Scale of orders
Ability to absorb costs	Ability to maintain gross margins in case of production losses caused by climate change
	Sufficient maintenance of gross margins post retrofit
Costs of alternatives	Price differential for better prepared/less exposed suppliers in the same region
	Price differential associated with relocation to less exposed production centre
	Cost associated with restructuring supply chain lead times to new production and transportation logistics
Company commitments	Length and nature of existing supplier contracts
	External commitments to responsible purchasing practices
Third party expectations	Importance of sustainable practices to customer base
	Shareholder expectations

Sources: Schroders. Shown for illustrative purposes only and should not be interpreted as investment guidance.

The foregoing analyses illustrate for investors and brands the risk and costs connected to the intensification of climate impacts for apparel value chains. Driving new investments in adaptation and directing the distribution of these risks and costs will require mechanisms that work at scale and across the industry. The following section outlines the role that governments can take to facilitate these industry transitions.

PART 4.
GOVERNANCE AND CLIMATE ADAPTATION. WILL REGULATORS FIX IT?

4.1 Worker-focused climate measures in global accountability and reporting schemes

In our first report, we reviewed a sample of protections against the effects of climate breakdown in national law and the parallel systems of private, voluntary regulation. With few exceptions, these frameworks leave worker and employer risks from extreme heat and intense flooding largely undefined and unaddressed.

At the global level and in the E.U. and U.S., home to many of the world's largest fashion brand, the standards and measures are similarly broad and mechanisms to accelerate climate adaptation efforts are not sufficiently outlined. In this section, we review the mandatory and voluntary frameworks—labor and environmental due diligence, trade policy, sustainability reporting—that attempt to connect companies at the fashion brands and their corresponding end-market regulators with the adaptation needs of workers and manufacturers in their supply chains.

Do we expect new mandatory frameworks to make a difference?

The European Union's Corporate Sustainability Due Diligence Directive (CSDDD), expected to be finalized by 2024, will require large lead firms to conduct and report on human rights and environmental due diligence activities along their value chains. The accompanying Corporate Sustainability Reporting Directive (European Commission, 2022c). and draft European Sustainability Reporting Standards (ESRS) are designed to track company progress and help regulators focus their enforcement efforts on the highest risk sectors and firms. The European Commission named textiles as a sector of concern along with extractives and agriculture, and all are due for industry-specific reporting requirements two years after the directive comes into effect.[23] Although the threshold is not specified, financial fines for non-compliance with the E.U.'s CSDDD are on the table. As an indication of what these might look like, a similar piece of human rights due diligence legislation already in effect within Germany specifies potential fines of up to 2 percent of annual turnover.

At present, these reporting requirements veer toward high-level, process-focused disclosures we are already accustomed to seeing today.[24] The problems of extreme heat and flooding in supply networks fit within the broad requirements that lead firms "provide an understanding of the ways in which the [firm] is addressing the material risks and pursuing the material opportunities related to workers in the value chain… [reporting on the firm's] physical and transition risks, and about their resilience as regards, and plans to adapt to, different climate scenarios and plans to adapt to the Union's objective of climate neutrality by 2050" (European Commission, 2022c).

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23 The Danish Institute for Human Rights provides a very helpful and regularly updated overview of E.U. sustainability initiatives: Holly, G., Lysgaard, S.A., Veiberg, C.B., Morris, D., Dicalou, M., Feld, L., Caygın, F., 2023. How do the Pieces fit in the Puzzle: Making sense of E.U. regulatory initiatives related to business and human rights (Revision 02/06/23). Danish Institute For Human Rights, Copenhagen.

24 See European Union, "Corporate sustainability reporting" https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en, accessed April 2022. There is a Draft ESRS Standard on Climate Change focusing on how the firm contributes to climate change (and efforts to reduce that impact) and financial risks that climate change poses to the company.

Table 10. Examples of value chain reporting standards and instruction in ESRS 2 (E.U.), 'Workers in the Value Chain'.

Disclosure Requirement	ESRS Instructions
S2-1. Policies related to value chain workers.	The undertaking [lead firm] shall describe its policies that address the management of its material impacts on value chain workers, as well as associated material risks and opportunities; and provide a summary of the content of the policies.
S2-2. Processes for engaging with value chain workers about impacts.	The undertaking shall disclose its general processes for engaging with value chain workers and their representatives about actual and potential material impacts on them.
S2-3. Processes to remediate negative impacts and channels for value chain workers to raise concerns.	The undertaking shall describe the processes it has in place to provide for or cooperate in the remediation of negative impacts on workers in the value chain that the undertaking has identified it has caused or contributed to, as well as channels available to value chain workers to raise concerns and have them addressed.
S2-4. Taking action on material impacts on value chain workers, and approaches to mitigating material risks and pursuing material opportunities related to value chain workers, and effectiveness of those actions.	The undertaking shall disclose its approaches to taking action on material impacts on value chain workers, and to mitigating material risks and pursuing material opportunities related to value chain workers and effectiveness of those actions
S2-5. Targets related to managing material negative impacts, advancing positive impacts, and managing material risks and opportunities.	The undertaking shall disclose the time-bound and outcome-oriented targets related to: (a) reducing negative impacts on value chain workers; and/or (b) advancing positive impacts on value chain workers; and/or (c) managing material risks and opportunities related to value chain workers.

Based on requirements like these, it is unlikely that a fashion brand would face meaningful sanctions for sourcing practices and due diligence failures that expose workers to harm from unbearable heat or intense flooding. Regulators or courts in corresponding jurisdictions in the E.U. will have to judge.

The United States is arguably further behind. The Securities and Exchange Commission (SEC) published a proposal for climate-related disclosures in 2022 that requires mitigation-focused disclosures—specifically, Scope 1 and 2 carbon emissions estimates—by large firms (US SEC, 2022). But specific outcomes measures for impacts on apparel workers, for example, are not required and in the U.S. and E.U. schemes and lead firms are largely permitted to define their own approaches, terms and targets.

Voluntary reporting frameworks

Voluntary frameworks for environmental, social and corporate governance (ESG) reporting to investors and stakeholders are in wide use by large corporations, including fashion brands and retailers. The Global Reporting Initiative (GRI) and Sustainability Accounting Standards Board (SASB) (now part of IFRS) are the leading frameworks for reporting on labor governance. The Carbon Disclosure Project (CDP) provides a similar framework with a focus on environmental issues, including climate change.[25] How stringent are these regimes? How close do they come to the climate adaptation issues outlined in our reports?

Like their equivalents in mandatory regimes, these reporting frameworks are typically input- and process-focused and none of those reviewed for this report explicitly address climate-related risks for workers. These frameworks allow a great deal of flexibility in approach, data to be reported, and its organization. Not unlike the mandatory reporting frameworks, 'describe your policy' or 'identify your risks' are standard prompts for firms.

The scope, and the value and comparability of data shared by companies via frameworks such as GRI and SASB are frequently criticized. A 2022 evaluation of GRI Health and Safety reporting by a range of companies concluded that many—particularly in high-risk industries like manufacturing—identified workplace safety and health as a material risk, but failed to convert those claims into concrete improvements for workers (Mariappandar et al., 2022).

25 CDP Worldwide, 2022. CDP Climate Change 2023 Questionnaire for General Sectors and Agricultural Commodities.

SASB's Apparel, Accessories and Footwear standard contains three measures on labor conditions, including a prompt to "[describe three of] the greatest (1) labor and (2) environmental, health, and safety risks in the supply chain" (SASB, 2023). The GRI framework's Disclosure 403-9 calls for numbers and rates for fatalities and "high-consequence" injuries, types of injuries and hours worked (GRI, 2018). Work-related illness is treated similarly. These disclosures are required only for facilities owned or controlled by the reporting firm. Risks for value-chain workers are dealt with via a requirement that echoes the corporate codes of conduct described in the first report: "a description of the organization's approach to preventing or mitigating significant negative occupational health and safety impacts that are directly linked to its operations, products, or services by its business relationships, and the related hazards and risks."

As with the factory-level monitoring and reporting schemes detailed in our first report, these firm-level reporting requirements—mandatory or voluntary, public or private—are frustratingly vague when it comes to value chain impacts and adaptation measures. They focus on inputs rather than impacts and description of process over clear measures of outcomes. These kinds of reporting approaches compare poorly to science-based climate mitigation measures and targets that have proliferated successfully within company reports. For example, the Carbon Disclosure Project's Framework reporting standard for emissions targets includes detailed metrics such as collection and reporting of "metric tons CO2e per metric ton of product" across operational and wider value chain activities.[26]

The obvious question here is, if firms can be held accountable for knowing and reporting on specific mitigation impacts—such as upstream Scope 3 emissions—when will they be held to similar standards for the tracking and disclosure of climate impacts on manufacturers and workers, and the outcomes of firms' adaptation investments?

4.2 Do trade policy and agreements address climate adaptation?

Labor and environmental standards have also been written into E.U. and U.S. trade policies and agreements for decades. However, they tend to be high-level and have left dispute resolution of these issues to consultative bodies or other mechanisms.[27] These mechanisms tend to involve 'state-to-state' negotiations, criticized for their slow processes and weak implementation (Buchanan and Chaparro, 2008; Harrison, 2019; Polaski et al., 2022).

Lower- and lower-middle income economies including Bangladesh, Cambodia, Kenya and Pakistan are participants in the General System of Preferences (GSP) or the U.S. African Growth and Opportunity Act (AGOA).[28] These systems tie reduced tariffs loosely to compliance with human rights standards, but environmental provisions are scant, and climate impacts are not actively addressed.[29] (Zerk and Beacock, 2021).

However, the 2020 U.S.-Mexico-Canada Agreement (USMCA) and the forced labor ban in the revised U.S. Tariff Act marked a departure from the hands-off, 'taking steps' trade policymaking of the last three decades (USTR, 2021).[30] The USMCA required reforms to Mexican labor relations and a 'rapid response' mechanism to resolve complaints involving exporters to the U.S.[31] However, the agreement and the U.S.'s wider 'worker-centered' trade policy stop at labor rights reform and do not address working conditions or environmental standards. Extreme heat and its effect on workers were reportedly a topic in consultations between the U.S. and Bahraini governments under the aegis of the trade agreement between the two, but there was no reported outcome.

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26 CDP Worldwide, 2022. CDP Climate Change 2022 Questionnaire. C4: Target and Performance.

27 Zerk and Beacock 2021 provide a useful overview of the variety of enforcement mechanisms used by trade agreements. Goals of the NAFTA environment side agreement included "(foster the protection and improvement of the environment in the territories of the Parties for the well-being of present and future generations; (b) promote sustainable development based on cooperation and mutually supportive environmental and economic policies; (c) increase cooperation between the Parties to better conserve, protect, and enhance the environment, including wild flora and fauna". https://ustr.gov/sites/default/files/naaec.pdf

28 At time of writing, the GSP status of Cambodia, Bangladesh and Myanmar had been changed to 'enhanced engagement' due to E.U. concerns about human rights conditions, with Cambodia's GSP benefits partly withdrawn. (European Commission, 2021)

29 The US GSP program was allowed to lapse by Congress in 2020, so is not in effect at time of writing. Lapses have occurred before, followed by reinstatement of the program. US system excludes most types of garments (USTR, 2023a). See Wong, 2022 for an overview.

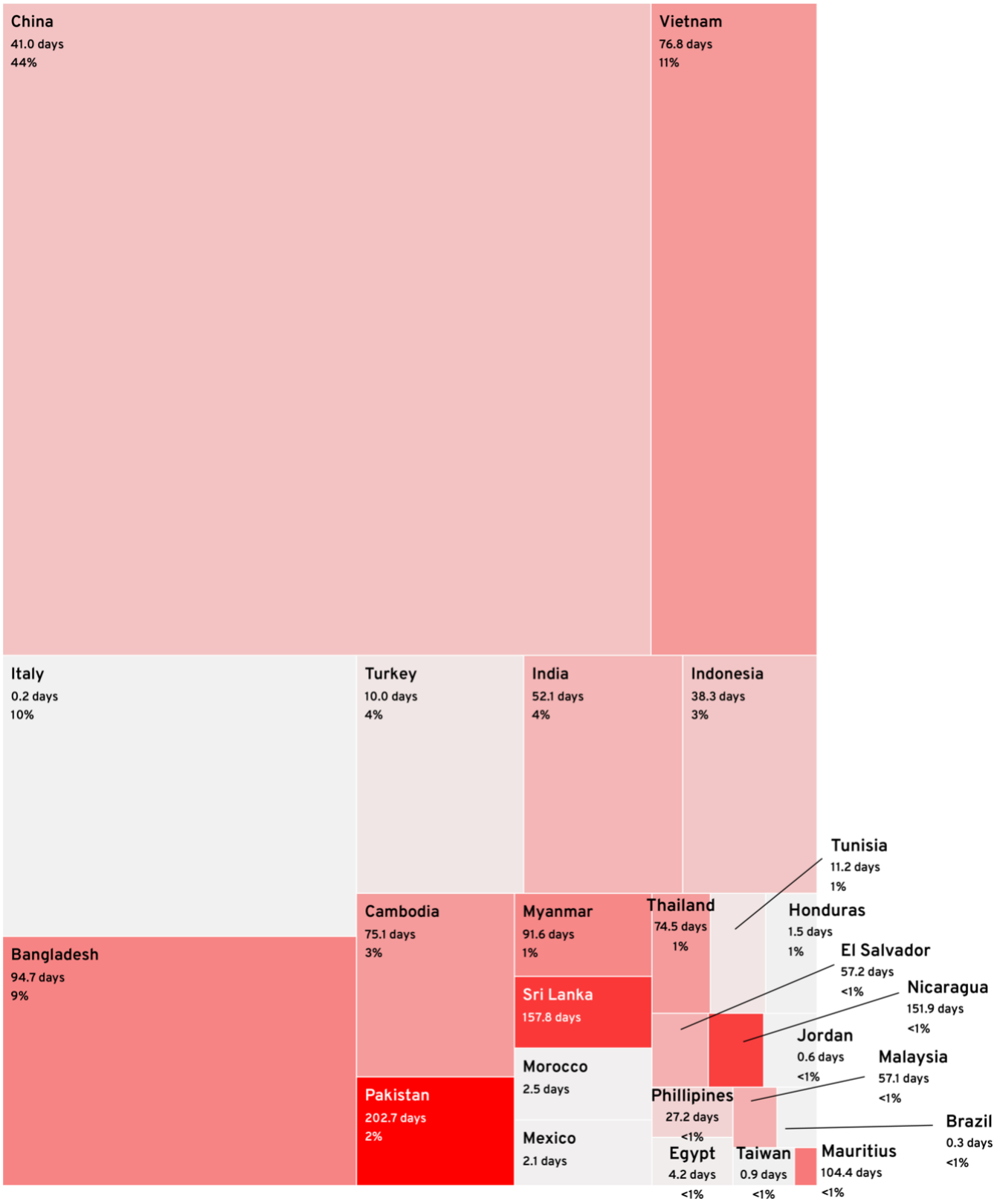
30 The act—passed in 1930—specifically bans "manufactured wholly or in part in any foreign country by convict labor or/ and forced labor or/and indentured labor under penal sanctions" (19 USC Ch. 4: Tariff Act of 1930, §1307).

31 See Scherrer, 2020 for an full overview of the labor components of the USMCA

The European Union's 2022 Carbon Border Adjustment Mechanism arguably comes closer with penalties for the import of goods that violate the E.U.'s carbon emission standards. The "landmark tool [puts] a fair price on the carbon emitted during the production of carbon intensive goods that are entering the E.U., and to encourage cleaner industrial production in non-E.U. countries" (European Commission, 2023).

The proactive use of trade policy and agreements to advance protections for workers change according to the political leanings of governments in the U.S. and the E.U. and tolerance for labor-related terms among trade partners at a particular point in time. But the direction of travel appears to be towards clearer protections and stronger enforcement. We expect that this will continue and encourage the active integration of worker protection in the context of physical climate risk. Where would agreements and policies that advance climate adaptation matter most for apparel workers in particular? The figure below, produced by the Katalyst Initiative and building on analysis from its 2023 report, *Trade Realities: Using Trade Data to Strengthen the Design of Supply Chain Governance*, reminds us of the sources of global apparel exports and their respective risk of extreme heat events (Curly et al., 2023).

Figure 23. Average exceedance days in 2050 (WBGT above 30.5, SSP 2-4.5), by country global apparel trade volume (2021, size).



Sources: Katalyst Institute, E.U. Copernicus.

Climate vulnerability and readiness vary amongst these producers, but as revealed in the first of our two reports, a significant share of global apparel and footwear production and workers must confront acceleration in extreme heat. The producers marked in bright red in the figure above—Pakistan, Sri Lanka, Nicaragua—present the greatest risk as measured by the WBGT exceedance days measure presented in our first report. They can, in theory, be engaged and moved by U.S. and E.U. trade policymakers on these issues.[32]

With this context, what combination of pressures, sanctions and rewards by policymakers, global investors, unions and brands themselves might protect workers in apparel supply chains from forthcoming climate breakdown? We address this in the final section of this report.

Bangladesh. Photo credit: ILO Better Work

32 Climate impacts can vary dramatically from area to area within a country. Here we use national WBGT averages--corresponding to national trade figures--to calculate exceedance days.

PART 5.
CONCLUSION AND RECOMMENDATIONS

These two reports have explored the tangible and somewhat overlooked risks associated with climate impacts in manufacturing supply chains. Even some of the world's most established apparel brands are failing to grasp the shortfall between the physical disruption from flooding and extreme heat—expressed as completely missed or productivity dampened days of production and risks to worker health and safety—and the potential solution of adaptation measures.

In tandem, investors are unlikely to have adequately factored these risks into future company analyses. With productivity headwinds expected across major production centres like Vietnam, Cambodia, Pakistan and Bangladesh, and growing focus on climate and workers in sustainability-related legislation such as CSDDD, this is a topic that warrants engagement to understand what contingency plans are in place—if any.

This gap in reality of impacts on the horizon and lack of concrete future-proofing set out in company disclosures can partly be explained by the loosely defined regulations and sustainability reporting requirements that exist today. As noted in Report 1, the national standards around extreme heat and flooding in relation to workers is severely lagging. In our focus region of South-East Asia, Malaysia has set forth decent guidance on heat stress, but our four principal production centres remain relatively ill-equipped when it comes to tackling these issues through national legal standards. Even supra-national bodies that specialize in workers rights, such as the ILO or Fair Labor Association do not set particularly concrete or detailed standards for companies when it comes to extreme heat and flooding.

In this report we have highlighted additional gaps in both mandatory and voluntary reporting around worker protections and physical risk, with emphasis remaining on reporting entity-determined thresholds of materiality and a preference for policy and process-based disclosures rather than decision-useful outcomes metrics. In addition to the potential financial costs on the horizon, with this relatively unclear landscape we are faced with the very pervasive risk that workers in apparel supply chains will endure ever worse conditions as the physical risks of climate change intensify. So where do we go from here? We set out our recommendations for different stakeholders below.

1. Investors

- Proactively analyze physical climate risk impacts within apparel supply chains to understand the potential value at risk.
- Engage apparel brands to encourage them to publish meaningful disclosures around supply chain workers and climate impacts, including outcomes-based KPIs summarizing efforts to undertake supply chain due diligence and adaptation investments.

2. Brands and retailers

- Analyze climate scenarios to understand the potential value at risk within supply chain operations, and commit sourcing and adaptation investments to climate-vulnerable industries, manufacturers and workers.
- Explore the return on investment from adaptation measures and support suppliers accordingly to retrofit physical infrastructure or shift production to lower risk locations. Potential avenues for financing such support could include sustainability linked bonds.

- Integrate provisions around heat thresholds and flooding into supplier code of conducts and terms of business. Ensure wages and social protections are ringfenced in cases of adverse disruptions to supplies from physical climate risks.
- Monitor impacts of climate risks on supply chain worker safety and wellbeing through social audits.

3. Governments

- Integrate climate adaptation and worker-rights related factors within trade policies.
- Establish remediation and resilience financing measures. These could arise from state budgets, lending and grants from international financial institutions and donors via a raft of funds including the Global Environment Facility (GEF), Climate Investment Funds, UN-REDD Readiness Program, and the Green Climate Fund (GCF).Brands and retailers can (be required to) contribute directly to national or industry-level adaptation investments. National governments could invert the E.U. carbon border tax to tax apparel exports by volume or value to fund adaptation investments in industrial areas, worker neighbourhoods and social protection programs.

4. Reporting frameworks

- Raise the profile and importance of addressing physical risk impacts in supply chains as part of existing mandatory human rights and environmental due diligence legislation, acknowledging the ties to potential financial fines and civil liability for egregious oversight of future impacts to workers.
- Integrate outcomes-based climate adaptation metrics into existing reporting frameworks, such as the forthcoming ISSB.

'What gets measured gets managed' has never been more true or urgent. Until the costs to both workers and bottom line attributable to extreme heat and flooding are more actively integrated into the equation of supply chain management, apparel brands will continue to overlook a potentially systemic issue. Particularly in an industry which is so inherently dependent on its outsourced manufacturing, the climate adaptation risks and costs must be shared. It is time for a shift in apparel's business model so that externalities of production are no longer absorbed by suppliers, and in turn their workers.

With Higher Ground? reports, we aim to inspire a conversation that ensures that brands and retailers, investors, international bodies and governments can no longer sidestep the question of adaptation. And we aim to drive industry actors to formulate, negotiate and enact adaptation strategies that are large-scale and fit for purpose.

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To get there, the Global Labor Institute pulls together fragmented constituencies—brands and retailers, manufacturers, unions, farmers, civil society organizations, regulators, investors—for evidence—based conversations and decisions.

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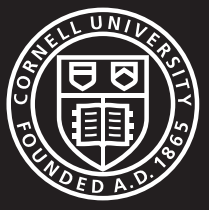

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