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The War in Ukraine & the Global Supply Chain

Prior to February 2022, global supply chains were already in a state of disarray and in the process of recovering from the unprecedented setbacks brought forth by the Covid-19 pandemic. The disruptions between manufacturers and the final destinations of their products resulted in materials shortages across the board, consequently bringing about higher prices. This was prior to February 2022, when supply chains were already functioning at a fraction of their pre-pandemic capability and efficiency. Russia's invasion of Ukraine in February of 2022 disrupted an already damaged system, in ways that have further amplified the magnitudes of difficulty consumers around the globe are suffering from. The war in Ukraine has resulted in incalculable damage to the local economies of Ukraine and Russia, as well as the rest of the world.

One of the primary disruptions in the global supply chain can be traced back to the halting of raw materials exports from Ukraine and Russia. Due to blocked ports in Ukraine and economic sanctions against Russia, the quantity of raw materials supplied (MIT), including aluminum, nickel, cobalt, palladium, and potash among others, have dropped significantly. Russia is responsible for 5.5% of the global aluminum production, as well as 11% of nickel production and 43% of palladium exports (OECD). These raw materials are used in everything from calculators to semiconductors to electric vehicles (IPS) and are thus required for manufacturers to continue production of a plethora of goods. Without access to Russia's massive reserves of these materials, businesses around the globe have had to slow or stall production, decreasing overall output and increasing prices. Furthermore, roughly 45% of the European Union's natural gas comes from Russia (Climate), so along with the heavy impact on the aforementioned materials, energy prices have also rapidly increased for much of the world.

On the Ukrainian side of the spectrum, exports of lithium, wheat and barley, and sunflower seed oil have been hampered to practically zero (Reuters). It's worth noting there is overlap between Ukraine and Russia regarding the raw materials affected by the conflict. The major component of these disruptions pertains to batteries, which require lithium, and the shift towards cleaner energy. Without access to Ukraine's lithium-mining efforts, the manufacturing of batteries for electric vehicles has bottlenecked, meaning otherwise finished vehicles must sit idle because they lack the necessary battery (IPS). Ukraine has a very competitive car-parts industry and, due the shortages mentioned above, it has been irreparably damaged in the near term. This is primarily due to the industry's reliance on "Just-in-time" manufacturing, which minimizes inventory by having components delivered as they are needed. Given the established supply

chain obstacles, parts are not arriving on time, and this is causing entire industries to come to a halt (IPS), which subsequently impacts markets in other parts of the world. Items aren't being produced, and the ones that are aren't being exported.

Perhaps the biggest issue is the damage to the grains industry, and the availability of potash. Ukraine and Russia were responsible for 24% of global wheat exports (Reuters) from 2016 through 2020. Cutting off wheat supply from these two powerhouses has had dire consequences for consumers around the world, but especially in developing nations. The war in Ukraine is exacerbating world hunger by stifling the global grain output, and increasing prices, which many people in the poorest countries simply cannot afford (NYTimes). In conjunction with this problem, the collapse of potash exports has made access to fertilizer much scarcer (Reuters). Potash is a vital ingredient in many fertilizers that enable farmers around the globe to have healthy crop harvests, and without fertilizer yields are expected to collapse. So, on the one hand, Ukraine and Russia are not supplying their past market share of grains, and the effects of this are compounded by the retention of potash within the two countries as farmers elsewhere cannot increase supply easily or affordably (Reuters). All of these factors are working together to make the cost of food increase and its availability decrease, inevitably magnifying the pre-existing global hunger crises (MIT).

In summary, the hardest hit raw materials across Ukraine and Russia have been aluminum, nickel, cobalt, palladium, potash, wheat and barley, and natural gas. Despite each country possessing rich reserves of these resources, they have been mostly inaccessible since the war in Ukraine began and this has ultimately contributed greatly to the inflation we are seeing on a global scale. As scarcity of each has increased, prices have acted appropriately and followed suit. This, of course, is on top of the already elevated prices due to pre-existing supply chain slowdowns brought on by the Covid-19 pandemic. Obviously, industries reliant on these exports have suffered, most notably the automotive industry, electronics industry, and the general foods industry. Producers have been unable to get the components necessary to make their goods, such as semiconductor chips for vehicles and electronics, causing prices to inflate to the point where supply and demand are more in line. Food prices have increased as well, given the overall reduction in grains output and availability, contributing to the global hunger problem. Inflated food prices are especially pronounced in developing countries, where people have lower incomes and have seen some prices of flour-based staples inflate over 300% (Reuters). All in all, it is likely many of the consequences instigated by the war in Ukraine will persist even after the conflict is resolved and could take years to adjust back to normal. The main reason for this is the extensive infrastructure damage in Ukraine. Major railways and transportation routes extending across Europe and Asia will require time to be repaired and fully functional (Railfreight), meaning exports and distribution logistics won't be at optimal capacity for a while.

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