



COVID19 AND SUPPLY CHAINS

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GOVERNMENT-UNIVERSITY-INDUSTRY RESEARCH ROUNDTABLE
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AGENDA

- Origins of supply chain vulnerability
- Implications for firms and for national security
- Implications for policy and research
 - Management and government policy
 - Research, especially research in management

COVID SHOWS THE FRAGILITY OF MODERN SUPPLY CHAINS

- Nations unable to meet surge in demand for masks, ventilators because production concentrated in China
 - Production initially hampered by disease
 - Desire to prioritize domestic distribution
 - Fragmentation
 - Mask: non-woven cloth, non-latex elastic
 - Firms lack knowledge of alternative sources of supply, ability to redesign
 - “100-year events” are frequent if many locations used
- Even national supply chains are inflexible
 - In US, food being dumped due to inability to shift from restaurant to grocery supply
 - Months-long shortage of toilet paper due to inability to shift from office to home supply
 - Different marketing channels, package sizes, product characteristics

THIS IS NOT THE FIRST TIME...

- Supply chains were disrupted by crises such as:
 - 2009- 2010 financial crisis
 - 2011 Fukushima Daiichi tsunami in Japan
 - SARS epidemic in China and Hong Kong in 2002–2003
- And won't be the last
 - There will be another pandemic—or several.
 - Climate change increases the probability of other kinds of natural disasters that can disrupt supply chains
 - Shipping and reshipping of components across the globe is a significant contributor to climate change (3% now; possibly 20% by 2050).

U.S SUPPLY CHAIN STRUCTURE ENHANCES VULNERABILITY

- Far-flung
 - 50% of manufacturing value consumed in US produced abroad
- Concentrated ownership of bottlenecks; Lead firm designs production process so that suppliers and workers focus on narrow specialities:
 - reduces barriers to entry → lead firm captures profits
 - need all components to make a product
- Supply chains have many small players with narrow capabilities
 - Lack organizational, financial capital for resilience
- Pressure to distribute profits to shareholders → little cash to weather a crisis, invest in R&D
 - 2010–2019, companies in the S&P 500 Index, which make up about 80 percent of the total market capitalization of companies listed on U.S. stock exchanges, distributed 93% of profits to shareholders as stock buybacks or dividends.
 - The world's three largest producers of N95 respirator masks—3M, Honeywell, and Kimberly-Clark—are U.S.-based, with most of their production being done in China. For 2010–2019, the proportion of profits distributed to shareholders was 121 percent for 3M, 90 percent for Honeywell, and 129 percent for Kimberly-Clark

CURRENT STRUCTURE OF GLOBAL SUPPLY CHAINS IS NOT INEVITABLE

- Origin in particular set of global and managerial incentives:
 - 1990s trade agreements with few protections for labor rights
 - Entry of China in WTO in 2000
 - Large payouts for managers based on observable financial metrics, not always closely tied to operational performance
 - Often but not always short-term
- Collapse of US manufacturing is recent
 - 1/3 of US capacity lost 2000-2010, with some rebound since
- Now there is little domestic supply of key medical products
 - 95% of surgical masks and 70% of respirators used in the US are now produced abroad.
 - in a single year (circa 2004), surgical masks went from being 90% domestically produced to 95% foreign produced when Kimberly Clark shut down its US factories and offshored its production.
 - last US penicillin factory closed in 2004; now 80% of pharmaceutical ingredients sourced abroad (most from China and India)

Sources: Helper, Gray, Osborne 2020; Adler and Breznitz 2020

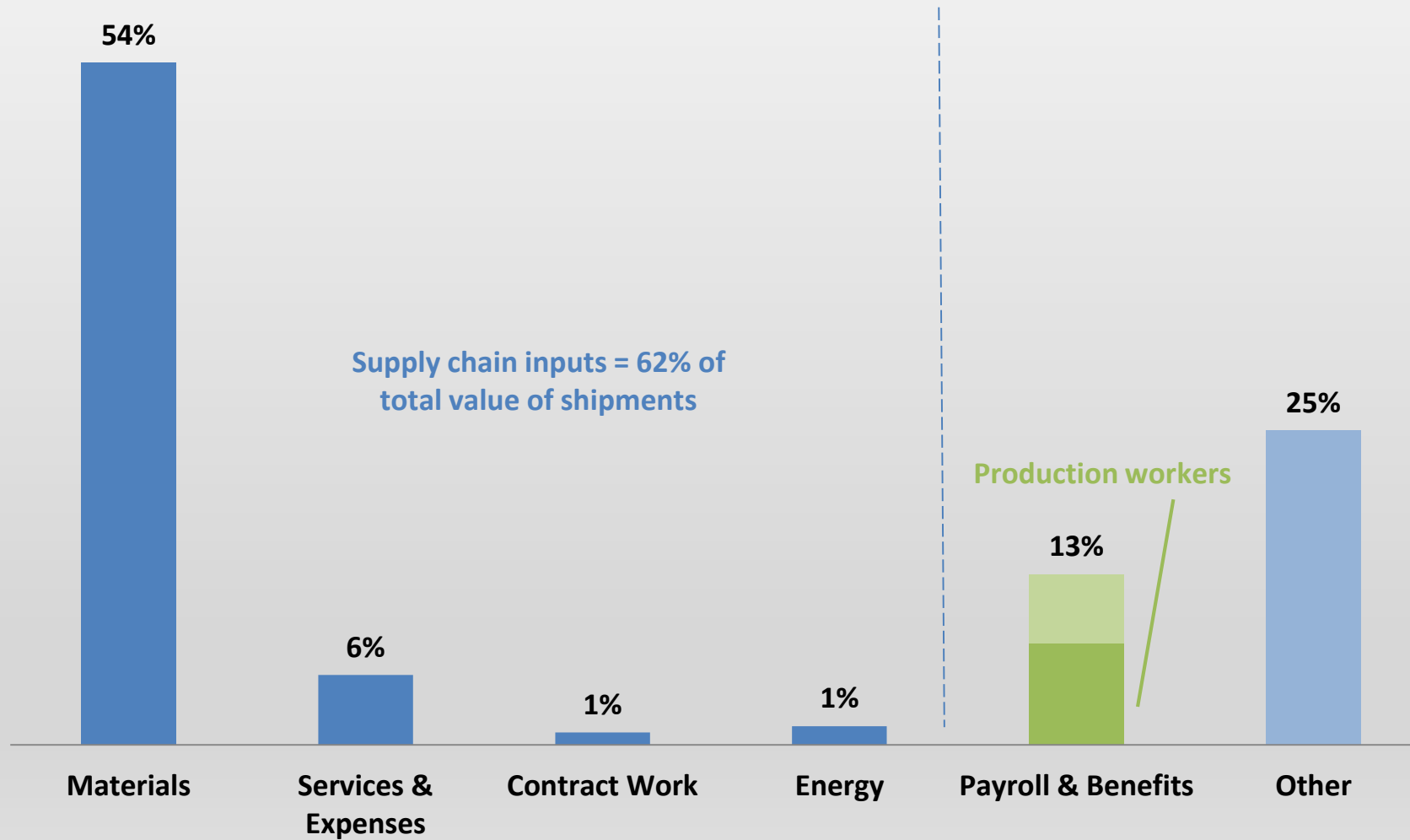
ON-SHORING NOT SUFFICIENT TO REDUCE VULNERABILITY TO DISASTERS

- We also need continued access to global value chains
 - Redress imbalance doesn't mean US needs to make 100% of everything
- US needs increased capability for innovation, flexibility

CURRENT SUPPLY NETWORKS NOT OPTIMAL FOR FIRMS

- While long supply chains inevitably increase disruption risk, the typical models used to make global sourcing decisions do not sufficiently consider this risk to individual firms.
- Purchasing function has become strategic/material to firms in last few decades – but incentives and data collection have not evolved to reflect this
 - Purchasing agents incentivized to buy items with lowest unit price—little consideration of hidden costs of far-flung supply chains

DISTRIBUTION OF MANUFACTURING INPUT COSTS, 2012 (AS A PERCENTAGE OF TOTAL VALUE OF SHIPMENTS)



Source: Census Bureau, 2012 Economic Census

HIGH-ROAD SUPPLY CHAINS

- There's another way to design supply chains so that all the players—shareholders, workers, and consumers worldwide—are less exposed to the risks and social costs inherent in today's global supply chains.
- Collaboration between management and workers along the length of the supply chain promotes sharing of skills and ideas, innovative processes, and, ultimately, better products that can deliver higher profits to firms and higher wages to workers.
 - John Gray, Susan Helper, Beverly Osborn, "Value first, cost later: Total Value Contribution (TVC) as a new approach for sourcing decisions," *Journal of Operations Management*, forthcoming

TOTAL VALUE CONTRIBUTION

- Our TVC method encourages managers to first consider how decisions affect value drivers, before considering costs.
- TVC encourages firms to tap into the expertise of their personnel in marketing and engineering, who have information on what customers value and the potential hidden costs and risks of using suppliers whose prices appear low.
- TVC empowers purchasing agents to contribute their expertise on the multidimensional capabilities of the supply base, rather than pushing them to prioritize cost cutting.
- It also helps firms make sourcing decisions for groups of products, rather than deciding on a case-by-case basis and, only too late, realizing excessive dependence on a single supplier or region.
- With appropriate measures of value, US suppliers look more competitive
 - Don't estimate cost differential by evaluating US cost to produce using a process optimized for China

PRINCIPLES FOR PUBLIC POLICY

- **Rebuild U.S. supply capabilities**
- **Assure stable long-term U.S. demand for key products**
- **Promote productive investment and good jobs**

REBUILD U.S. SUPPLY CAPABILITIES

- Understand sources of vulnerability
 - Transparency on location and amount of purchasing
 - Bipartisan bills call for mandatory reporting of supply chain information (for drugs, etc), assessment of supply chain weaknesses
- Remove hidden subsidies for offshoring
- Rebuild supportive ecosystems

REMOVE HIDDEN SUBSIDIES FOR OFFSHORING

- Require drug companies to indicate on all labeling where both the finished drug and the active pharmaceutical ingredients were made. This transparency will allow consumers to know where their drugs come from and possibly allow domestic drugs to fetch a price premium.
- Institute unannounced inspections of foreign drug facilities; the current practice is to preannounce foreign plant inspections, giving them a regulatory advantage over domestic plants, where inspections are unannounced.
- Pass on the increased costs of oversight and the societal impact of foreign production of drugs to the firms that produce them.

REBUILD SUPPORTIVE ECOSYSTEMS

- Individual companies, even huge firms like 3M, can't rebuild domestic supply chains all on their own
- National governments can help match supply and demand for specialized assets and skills
 - Convene supply chain players to develop a roadmap for products ripe for reshoring
- Nurture supportive ecosystems of innovative small and large firms
 - Provide better access to trained workers, applied R&D, and finance
- Subsidies for innovation and production that help achieve national goals
 - Respond to crises
 - Prevent future crises, eg climate change

ASSURE STABLE LONG-TERM U.S. DEMAND FOR KEY PRODUCTS

- More requirements that government purchases be Made in America
 - Includes “low-tech” PPE
- Build “real options” for pandemics and other crises

“REAL OPTIONS” FOR PANDEMICS & OTHER CRISES

- We don't know the exact future dimensions of the next crisis
- We can stockpile some likely items in advance, eg, some masks, ventilators etc.
 - A useful part of the response
- But more efficient would be to create “real options”: operations that can provide what turns out to be needed.
 - surge capacity: producers buy more general equipment than they otherwise might (eg, flexible instead of fixed automation, and maintain inhouse the capability to reprogram; additive manufacturing).
- Could the government reimburse companies for the extra expense involved in buying and maintaining this equipment? Periodic drills to test compliance?
 - Hidden benefit of US/Canada auto rescue: maintain organizational ability of Ford and GM to quickly identify suppliers of parts and equipment, maintain broadly trained workforce

PROMOTE PRODUCTIVE INVESTMENT AND GOOD JOBS

- Govt efforts to prepare not always successful
 - Newport Medical Instruments, which received a [contract to manufacture ventilators](#), was bought by Covidien, and Covidien was bought, in turn, by Medtronic PLC, which made competing products and so [stalled the U.S. government contract](#).
 - Taxpayer investments in R&D often used for production abroad
- Limits on the financialization of firms and measures to empower workers as productive stakeholders can ensure effective use of citizens' dollars.
 - Worker voice
 - Ensure access to PPE
 - Build flexible skills
 - Promote investment in productive capability rather than payoffs to finance

CONCLUSION: GOALS

- We need a broader conception of national security and of corporate responsibility
 - “Security” includes efforts to reduce bad outcomes due to health, climate, economic emergencies (not just military)
 - Include stakeholders other than shareholders
- “High road” policies can improve performance of supply networks
 - For consumers and firms: Faster response to demand fluctuations
 - For workers: Better jobs, more stable employment
 - For environment: Reduced carbon emissions
- Vision: Competition and cooperation based not on low wages, high pollution –but innovation, broad conception of national security

CONCLUSION: RESEARCH TOPICS

- How should firms balance interests of multiple stakeholders
- How can government policies better align social and private incentives for the right amount of risk-taking
 - Can we innovate in forms that surge capacity takes? (additive mfg, govt payments for flexibility)
 - Who should pay to maintain this capacity, and how (social vs private incentives)
- Implications for future nature and amount of globalization
 - foreign ingenuity has contributed much to our prosperity, so U.S. supply chains should not become 100% domestic. But both public and private leaders need to fully take into account the risks of far-flung supply chains.
 - Currently-poor countries could benefit
 - More focus on domestic demand, building integrated capabilities
 - Less instability, need to curry favor with multinationals

BACKUP

SOURCES

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- <https://fortune.com/2020/07/25/ppe-supply-chain-national-security/>
- <https://waysandmeans.house.gov/sites/democrats.waysandmeans.house.gov/files/documents/Erica%20Fuchs%20Testimony.pdf>
- <https://equitablegrowth.org/policy-options-for-building-resilient-u-s-medical-supply-networks/>
- John Gray, Susan Helper, Beverly Osborn, “Value first, cost later: Total Value Contribution (TVC) as a new approach for sourcing decisions,” *Journal of Operations Management*, forthcoming

IMPLICATIONS FOR WORK OF THE FUTURE

- Increased automation, both for cost and social distancing reasons
 - Worker-complementing automation could enhance flexibility
 - Additive mfg at GM plants
 - But lack of worker voice reduces ability, incentive for such automation
 - Who programs the cobots?
- More remote work may mean
 - more decontextualized discussions that are harder for those with tacit/craft skill to participate in?
 - fewer supervisors, so more autonomy to figure out work methods?