Cross-network weaponization in the semiconductor supply-chain

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How do states' positions across multiple and interconnected economic networks affect their power?

Weaponized Interdependence



Figure 1: The Chokepoint effect

The global economy is made of multiple different, but interrelated networks

Energy (Meierding 2020):

- 1. Oil production & consumption
- 2. Financial (Payment, insurance, etc.)
- 3. Transport

Cross-network weaponization



Figure 2: Chokepoint effect across networks

- 1. Topography: Not only one, but two networks must be sufficiently centralized.
- 2. Domestic institutions: States must be able to link issues to exert authority overt economic hubs across multiple networks.

Supply chain activity	Network	Data
Design	Network of patent citation	National citations in CPC H10L patent filing from the OECD triadic patent database
Materials	Network of trade in silicon	Sum of bilateral trade value in HS 280641 and HS 280649
	Network of trade in hydrogen fluoride	Bilateral trade value in HS 281111
Production equipment	Network of trade in semiconductor production equipment	Sum of bilateral trade value in HS 381800, HS 848610, HS 848640, HS 903082 and HS 903141
Assembled semiconductors and integrated circuits	Network of trade in semiconductors	Sum of bilateral trade value in HS 8541 and HS 8542

Table 1: List of networks and data sources

The U.S. has a marginal position in the global trade network of assembled semiconductors...



Figure 3: Global trade of assembled semiconductors in 2019

... but it controls the design network



Figure 4: Patent citation network, 1950 - 2019

According to Morris Chang, CEO of TSMC, "the U.S. has a very good position in semiconductor technology-design, the U.S. has got most of the design capability in the world, the best design capability in the world. Taiwan has only a little, TSMC has none." (April 19th, 2022)

In August 2020, the United States extended indicated that Huawei-related companies could not buy any products that are the direct product of U.S. technology or software specified in the list of control products.

Huawei CEOs estimate that U.S. actions cost them US\$ 30 billion. Industry reports also indicate that Huawei went from ranking second in global smartphone sales, trailing only Samsung, to falling out of the top 5 companies