

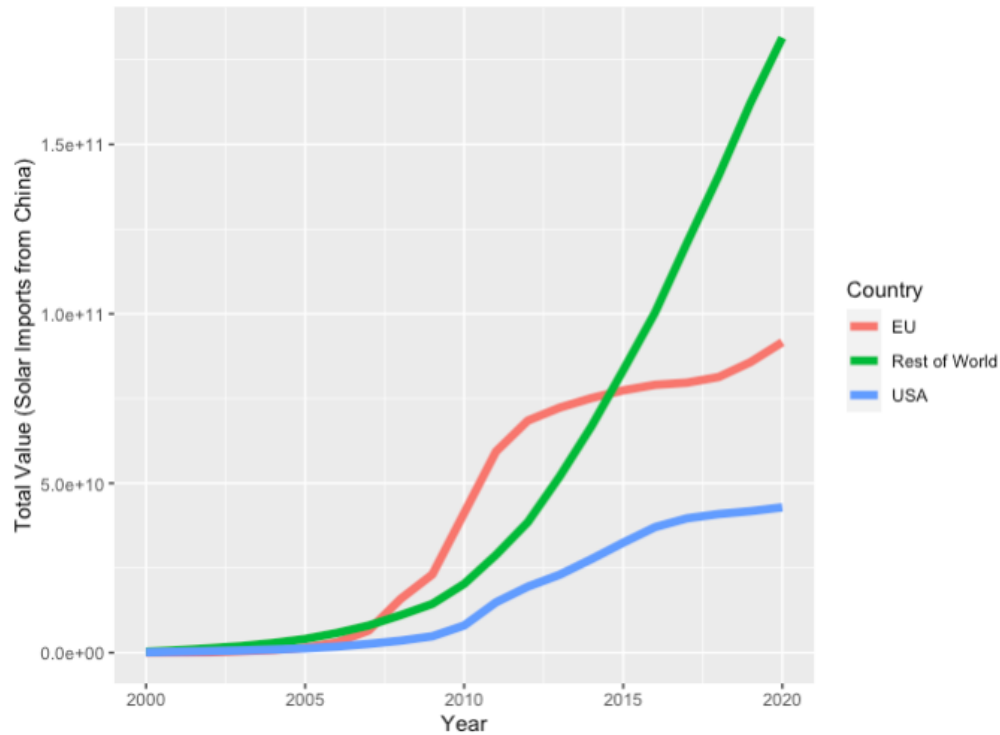
Research Note: Solar Supply Chain Fragmentation and Local Deployment in Southeast Asia
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Tariffs on Chinese exports to the United States (US) and European Union (EU) have reshaped global supply chains across a variety of critical industries including washing machines, steel, semiconductors, and solar panels. The latter, solar panels, are an essential component of the global energy transition. As the US and EU have escalated tariffs on the import of solar modules from China, Chinese firms have rearranged supply chains to manage the new transaction costs of Western trade partners (Bradsher 2014; Ball et al. 2017). While significant attention has been drawn to the impacts of tariffs on the US, EU, and Chinese energy transition, these trade disputes also reshape solar value chains for often-overlooked middle income countries caught in the crossfire of international competition (Houde and Wang 2022; Andres 2022).

In particular, tariffs on solar imports led Chinese firms to offshore and scale up existing solar panel manufacturing in Malaysia, Thailand, Cambodia, and Vietnam to circumvent antidumping duties. These four countries, currently under investigation by the United States Department of Commerce for a new round of anti-circumvention tariffs, received an influx of Chinese manufacturing investment. Additionally, these countries saw an increase in local solar manufacturing managed by Chinese firms seeking to avoid tariffs on imports from mainland China to the United States (Wong, Singh, and Casey 2022). Emerging literature on global value chains contends that foreign manufacturing investment can create spillovers in downstream segments of the supply chain by reducing the material costs of inputs and transaction costs of procurement for domestic firms (Javorcik 2004; Blalock and Gertler 2008). However, contrary to scholarship emphasizing the localization of manufacturing for technology transfer, early interview evidence indicates that cost reductions to solar investors in Malaysia occurred not through manufacturing localization, but by importing panels from mainland China itself.

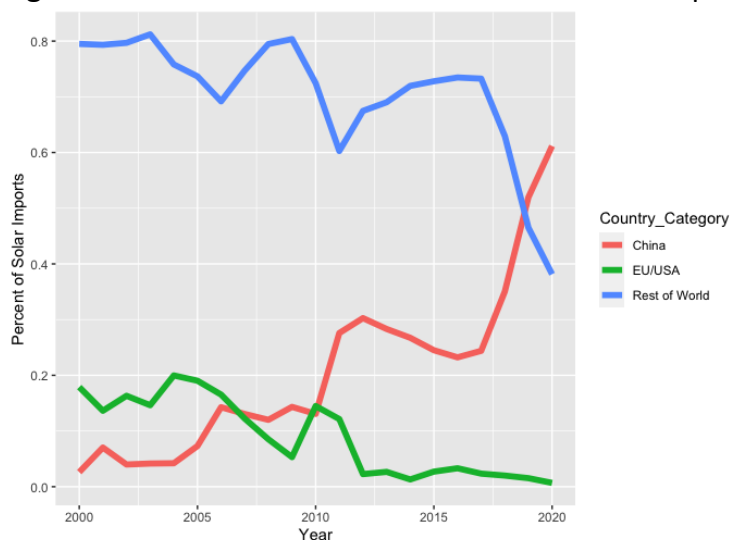
The unique circumstances surrounding Chinese production relocation, namely avoiding Western tariffs, complicate the likelihood of forward linkages to local suppliers. First, when exports from mainland China decreased for certain countries, such as the United States and European Union, after the imposition of antidumping duties, panel exports increased to the rest of the world. This provided countries, such as Malaysia, with a new source of solar panel supply. The figure below (Figure 1) illustrates this trend, plotting total value of solar from Chinese imports to the EU, USA, and rest of world over between 2000 to 2020. While US and EU reduce their solar panel imports from mainland China after tariff imposition, the rest of the world continues to import increasingly more solar manufactured in China.

Figure 1: Solar Imports from China (Percent of Total Value)



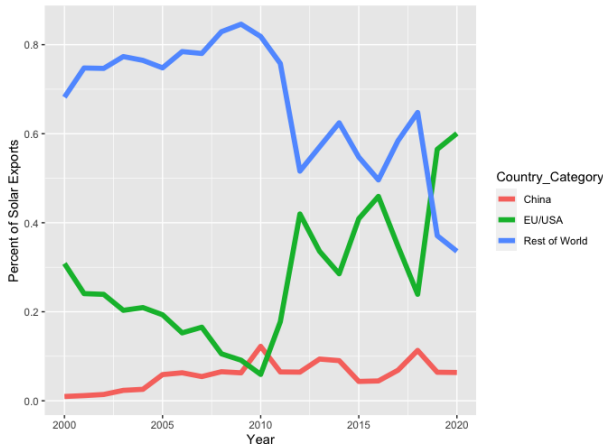
Second, exports from four Southeast Asian countries—Malaysia, Thailand, Cambodia, and Vietnam) —are now under investigation by the United States Department of Commerce for tariff circumvention, increased to countries with active anti-dumping duties, namely the US and EU. Simply put, panels manufactured in Malaysia were exported to countries with tariffs against China, not purchased by local firms. While Malaysian firms did use Chinese panels, they were imported from China rather than produced locally. The figure below shows that solar imports from China do increase to these four Southeast Asian countries.

Figure 2: Where does Southeast Asia source its solar panel imports? (Percent of Total Value)



However, these Southeast Asian states also export an increasing amount of solar panels to the US and EU after these Western states impose tariffs on imports from mainland China, consistent with a strategy of tariff circumvention.

Figure 3: Where does Southeast Asia export solar panels? (Percent of Total Value)



Evidence from my forthcoming research, which draws upon solar panel trade data and interviews with solar firms in Malaysia, currently in progress, support the narrative that Malaysian solar firms are using panels imported from mainland China rather than those produced in Malaysia itself. Interviews with both large and small firms overwhelmingly suggest that solar investors import panels directly from mainland China. Multiple firms across size categories indicated the vast majority - 99 percent by one interviewee's estimate - of solar panels installed on Malaysian rooftops are imported from mainland China.¹ Chinese factories on the mainland profit more from selling to Malaysia, and the rest of the world, relative to the US and EU after the imposition of tariffs. Chinese firms producing in Malaysia, on the other hand, reap a higher profit from exporting solar back to the US instead of selling to locals.²

Despite the lack of localized production networks, interviewees do not report difficulty in accessing imported Chinese equipment. This is, perhaps, is most surprising for small firms that do not have established connections to global solar component suppliers. Even for smaller investors, such as warehouse owners and boutique construction companies, importing solar panels from mainland China is the most cost-effective solution.³ A large firm reports being contacted by Chinese suppliers in search of likely customers⁴, while smaller companies work with engineering, procurements, and construction (EPC) firms that have connections outside of China and can easily source panels from abroad.⁵ Since the Malaysian solar industry has a variety of both large and small domestic players, small firms can draw on the experience of

¹ Interview #1 (May 15, 2023), Interview #3 (May 30, 2023), Interview #4 (May 31, 2023), Interview #6 (June 6, 2023), Interview #7 (June 7, 2023).

² Interview #1 (May 15, 2023), Interview #3 (May 30, 2023), Interview #8 (June 10, 2023).

³ Interview #2 (May 16, 2023), Interview #6, June 6, 2023

⁴ Interview #1 (May 15, 2023)

⁵ Interview #2 (May 16, 2023)

their larger industry peers. Furthermore, certain Malaysian-made solar panel alternatives cannot compete with imports from Chinese manufacturers. A representative from a medium-sized firm specifically noted that American, Japanese, and South Korean panels manufactured in Malaysia are now relatively costly in comparison to Chinese imports, although in the early days of the market, South Korean cells were used for some local installations.⁶

China's impact on the global economy has made its mark on Malaysia not through production localization, but instead lowering the cost of components and allowing smaller firms to afford the high capital costs of clean technology. In sum, the cost of components' steady decline, enabled by China and its earlier industrial policies, allowed for industry growth abroad. Production localization, on the other hand, had scant impact on the local market in any way, shape, or form.

⁶ Interview #3 (May 30, 2023)