

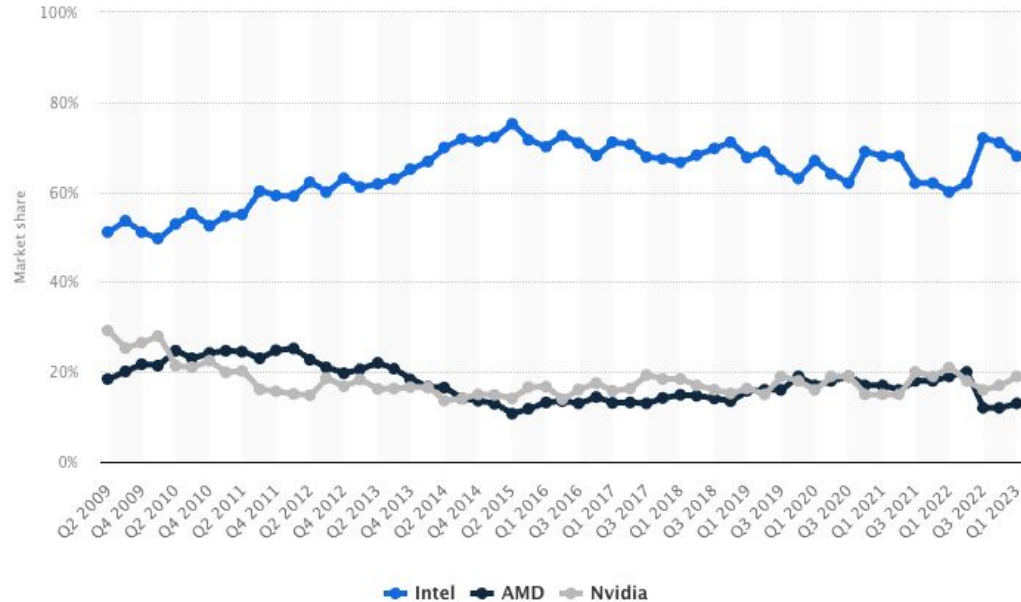
Factors Influencing the Shortage of Graphics Cards

By Trevor Mudarth



What is the Graphics Card Market

- The Graphics Card market, is worth USD \$59.35 Billion as of 2023 expected to grow to USD \$595.20 Billion by 2040
- This Market has a year over year growth of 31.6%
- The Biggest Players in this market are Nvidia, Intel, and AMD. Intel is the largest producer of integrated GPUs, whereas Nvidia is the largest producer of dedicated GPUs
- This Market is characterized by Rapid Technological Innovation, Fierce Competition, and Diverse Consumer Preference





ASSUMPTIONS BEING MADE

- This is occurring in 2021 when there was a shortage in the graphics card market due the events surrounding the Covid 19 pandemic
- The Market is an oligopoly, where there is a small number of firms, they produce similar products, and there are high barriers to entry





PROBLEMS IN THIS MARKET

Many problems have recently erupted, and it is important that your company controls them in order to stay competitive

Supply Chain Issues

- Covid 19 lockdowns forced many of the graphics card companies suppliers to temporarily shut down, leading to supply chain issues
- Additionally a key component of graphics cards, being semiconductors, is in shortage.

Cryptocurrency Mining

- Availability of graphics cards, was damaged due to crypto currency boom, leading to many people buying graphics cards for unintended reasons
- Damages consumer loyalty

Secondary Market

- Individuals would purchase graphics cards in large quantities, and resell them for inflated profits
- This makes it look like graphics cards from that company are too expensive leading to consumers buying from a competitor who has availability



WHY THIS IS BAD

- Due to a combination of all previously mentioned factors, a market shortage occurs
- Shortages lead to higher prices as there is now a gross imbalance between supply and demand
- Deadweight loss occurs as there is an underproduction of graphics cards
- Economic Growth is stifled as there is less consumer spending, leading to less investment from other firms



GAME THEORY EXPLANATION

- As the graphics cards market is an oligopoly, the shortage in graphics cards can also be explained through game theory
- Consumers are a player in this market, who are strategically hoarding graphics cards as they are receiving information there is a shortage. This behaviour exacerbates the current shortage
- There is an externality in this market being the semiconductor shortage. This shortage of semiconductors is heightened as demand for graphics cards are higher due to the ongoing pandemic
- Producers are only producing more of their highest margin products as there is less resources to allocate to the lower margin products



Solutions to This Problem

- It is important for Consumers to understand that the shortage is temporary. The consumers panicking and hoarding graphics cards makes the problem worse. It is also important for consumers to not purchase resold graphics cards at the market up prices, as it incentivises resellers to hoard more
- The manufacturer can instruct distributors to set limits on the amount of graphics cards an individual can buy. This will prevent hoarding and reselling
- The Manufacturer can innovate its product to make it worse for crypto mining. As was done, in recent years graphics cards manufacturers lowered to hash rates on their cards to make it less effective for mining cryptocurrency
- The firm could also diversify their suppliers. This would make it so they are less reliant on a single supplier, so if they shut down they are not bottlenecked



Outcomes Of These Solutions

- Many of these solutions would be enacted to ensure fairer distribution of graphics cards. If these policies are enacted, consumer panic would decrease and the shortage would be more manageable
- By addressing the shortage, the firm would bring equilibrium back to the market. This will combat deadweight loss
- If the firm finds new suppliers, their supply line would be mended, leading to an increase in supply





Potential Downsides

- By reducing certain aspects of the graphics cards that are beneficial for cryptomining, this may affect the performance of the cards for intended use cases. This would result in an inferior product
- If the Firm were to diversify their suppliers, they may produce an inferior product as they are collaborating with untrusted suppliers
- It is unknown whether making consumers aware that the shortage is temporary will effectively stop them from panic hoarding. This would result in wasted resources on making consumers aware of the situation

