The disruption of global markets by earthquakes: Risk analysis of PC supply chains

by

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ABSTRACT

After the 1999 earthquake in Chichi, Taiwan production in most major Taiwanese semiconductor manufacturing plants was stalled or significantly disrupted for a period that lasted up to two weeks after the original major tremor. This production disruption created a shortage of computer memory chips, resulting in turn in an increase of their long term contract price by 25%. Furthermore, wholesalers uncertain about the magnitude of the earthquake's consequences, got in a hoarding frenzy raising for a brief period the spot price of memory chips 4 to 5 times higher than usual.

I analyze the different supply chain strategies Personal Computer (PC) producers use to establish that companies best adapted to the long term trend of declining prices of PC components for the same performance (Moore's Law) are also the most exposed to price shocks due to natural disasters. A notable example is Dell Computer, the company that set the trend of direct sales through internet and telephone, which reported reduced earnings because of the Taiwan earthquake sending its stock price down by 7% in one day. Direct-Sales companies use a Just In Time (JIT) production system securing a sale first and buying components a week later, thereby realizing significant profits the faster component prices fall. Accordingly, Direct-Sales companies realize significant losses when component prices go up.

The 1999 earthquake in Taiwan may be characterized as a near miss from the point of view of semiconductor manufacturers. An earthquake with an epicenter close to Hsinchu, the location of many PC component production plants, may cause significant structural and equipment damage leading to disruptions lasting for many months. A long disruption period in PC component supply may have devastating effects to PC producers. I briefly describe policies for risk mitigation and transfer against earthquake caused disruptions to the global PC supply chain.

The global PC market is a prime example of the "new economy", obeying different rules than usually expected. In particular, the informal contracts and codependence between PC producers and their suppliers may necessitate innovations in risk transfer instruments. In addition, direct sales through the internet are considered to be the wave of the future not only for PCs, but also for most other products. In this light, studying Dell's earthquake risk exposure becomes particularly interesting and instructive.