



Biggest Chip Change in 2004: Taiwan's Invasion of Mainland China *(Part I: China Myths & Realities Series)*

Summary: The key destabilizing force currently confronting the semiconductor industry is the relocation of its center of gravity to China, which Precursor believes will benefit rather than undermine the leading Taiwanese foundries TSMC and UMC. **In '04, Precursor expects Taiwan to significantly ease export controls that have limited its companies from building facilities in the People's Republic of China. The result will likely be a massive invasion of the mainland by Taiwanese companies, which have the capital, expertise, language and proximity to be the big winners in the shift to China. The first sizable companies to benefit are likely to be TSMC and UMC, the market-leading foundries that are the crown jewels of Taiwan's semi industry. While the conventional wisdom is that China's foundry ambitions will harm TSMC and UMC, Precursor believes that absent political restraints they will move across the Straits of Taiwan in a serious way now, while the Chinese foundry business is still in its formative stage. This enables them to retain their leading position, sustain their growth beyond '04 and blaze a path the rest of the Taiwanese semi industry will follow.**

Export Controls Now in the Way. The global foundry industry, which is driven by the rise of fabless firms and outsourc-

ing by integrated device manufacturers, is concentrated in Taiwan. TSMC and UMC account for about two-thirds of industry revenues, and have consistently outperformed the industry as a whole over the past five years. TSMC grew 25% last year to \$6b in revenues, and with leading-edge production now at full capacity, is positioned to raise its prices and grow more in '04. The clouds on its horizon are blowing from China, whose five-year plan calls for 25 new fabs. Nascent but growing production capacity, exploding demand, and favorable tariff policies provide big incentives for foreign investment in China. While the volume of chip production is still modest (about one-tenth of Taiwan's) and is decidedly trailing-edge, China brought more fab capacity online in '03 and has more under construction than any other region. Its demand for chips is nearly insatiable, both from manufacturers (producing most of the world's toys and half of its cell phones) and from consumers (the biggest market for handsets and second biggest for PCs). China protects its fledgling industry through tax breaks and low interest loans, on top of cheap land, labor and utilities and an effective VAT of 3% on chips produced domestically, versus 17% on imports. **TSMC needs to capture part of the 25% annual growth in chip demand in China to remain the leading foundry**, but has

been blocked by its own government, which doesn't want to lose its technical superiority. However, the controls restricting exports to China seriously began to erode in '03 as the Japanese, German, and to a lesser degree the U.S., governments authorized the export of leading-edge chip manufacturing processes to China. So while the controls once protected Taiwan's lead, they are now a drag on its growth.

TSMC's Advantage Is Leading Edge Mastery. Infineon, the final DRAM maker in Europe, has begun sharing the expertise to produce chips at 110 nm processes on 300 mm wafers (close to the leading edge) with SMIC, China's largest pure-play foundry. Japan's Elpida (a joint venture of NEC and Hitachi) has given SMIC a five-year contract to supply it with DRAMs built on leading edge processes. The U.S. government has created a special license to pre-authorize sales to SMIC, which has also signed up TXN, Broadcom, and Toshiba as customers. SMIC raised \$630m in '03 to finance its expansion (three new 300 mm fabs) and although it only produced its first chips in '01, is now fifth worldwide. To secure approval to build on the mainland, TSMC had to limit the plant to 200 mm wafers and 250 nm processes. This makes sense if you're worried about tech transfer, but **in the long run it makes no sense to**

spend precious capex on trailing-edge processes when the new ones are so much more efficient. (Moving from 200 mm to 300 mm wafers and reducing manufacturing processes from 180 nm to 130 nm, for example, brings a 4-times improvement in manufacturing output per wafer.) **TSMC anticipates receiving approval to equip the facility this year.** With only \$350m in revenues, SMIC is still just a minor irritant to TSMC. But as an indication of the growing rivalry, TSMC filed a lawsuit in December accusing SMIC of espionage. The suit may delay SMIC's plans to go public this spring but does little to inhibit its growth or change the incentive for the Taiwanese foundries to compete with it by building plants nearby. **As leading-edge processes are introduced into China, we expect TSMC and UMC to get permission from their government to follow, since failure to allow them to move into China would ultimately be self-defeating.**

Following the Fabs. Once the floodgates have opened, the rest of the Taiwanese semi industry will follow. Last week Taiwan approved a request by Quanta Computer (which OEMs most of the world's laptops for Dell, HP, Gateway, Apple) to invest 10% of its capital in China, another indication that the export of Taiwanese money and expertise to China are accelerating. * *

