



China's Emerging Industrial Capabilities

Loren Brandt
Department of Economics
University of Toronto

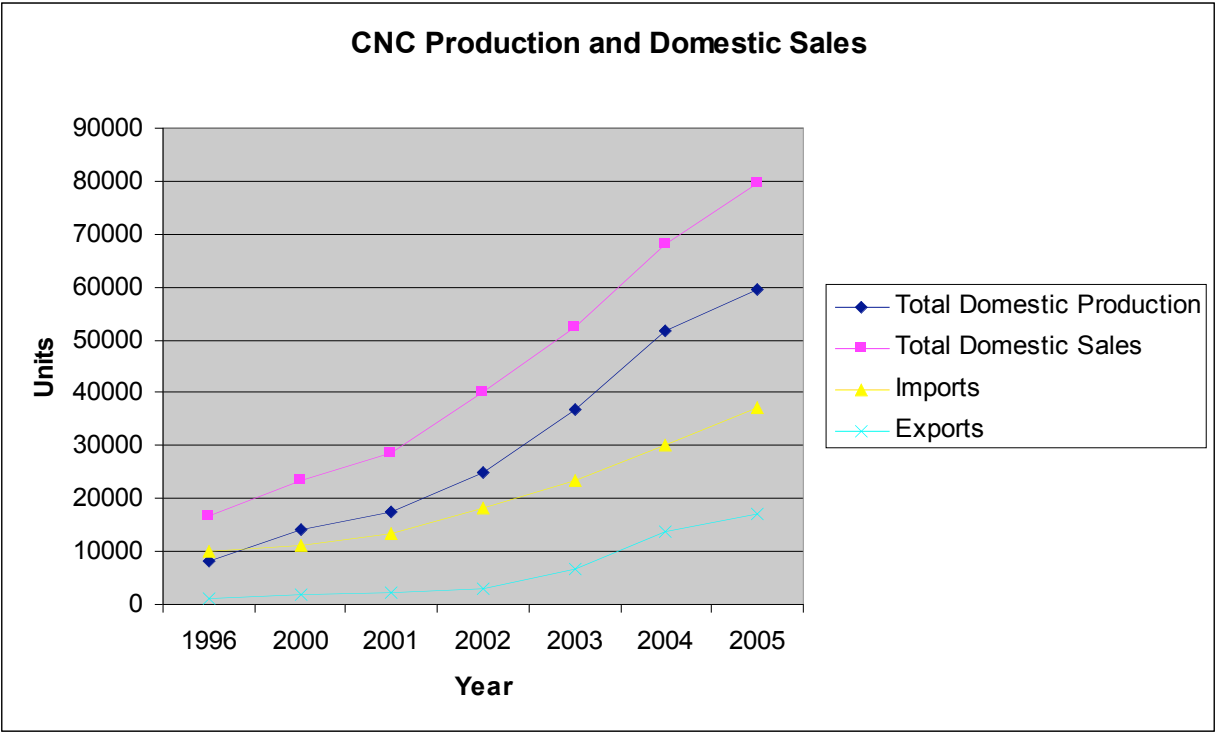
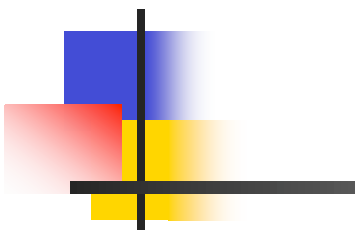
The Unused Horizontal CNC Lathe





Why Machine Tools (Lathes)?

- Demand Side:
 - World's largest and most rapidly growing market (\$US 12 billion; \$US 8 billion for CNC 2006); upgrading in downstream sectors
 - Shift in demand towards CNC (numerically controlled) machines that accelerates in mid-1990s
- Supply side:
 - Significant "in-house" capabilities required to design, develop and mfg CNC lathe; key components, e.g. ballscrews, spindles, gear box, numerical controls often designed and made in house (Haas, Okuma); mfg itself requires significant know-how; high value-added sector





Process of Capability Building (1)

- Difficult adjustment towards CNC machines by SOEs (State owned enterprises), which had dominated the traditional industry, and built CNC machines under licensing/coop agreements with leading international firms; early 1990s, upwards of 100 firms, each of which produced no more than 125-150 machines
- Joint ventures, often involving the SOEs, and WOS, established over past decade are building capability in low to medium end of the CNC market; e.g.
 - Dalian Machine Tool with Index (Germany);
 - Beijing Number 1 with Okuma (Japanese);
 - Baoji Machine Tool with Daewoo (Korea)
- Also, horizontal transfer of know-how to SOE partner through the JV, complemented by recent overseas acquisitions by SOEs to obtain technical and mkting know-how,
 - Shenyang Machine Tool and Schiess AG
 - Dalian Machine Tool and Ingersoll



Process of Capability Building (2)

- Role of suppliers --- last few years domestic outsourcing of critical components:
 - Ballscrews
 - Spindle
 - Numerical control (Siemens and Fanuc)
- Import substitution in low to-medium end of the market with imports serving higher end (multi-axis, multi spindle); Imports consistently 50% of sales in value terms;
- Exports emerging at low end of the market



Challenges for domestic firms

- Single spindle, double axis “bread and butter” of domestic firms
- Must move to mid-range segment of market in which variety is extremely important; significant investments in time and expense in learning to develop product “repertoire”
- Quality issues
 - Product quality, esp reliability, durability and speed (rather than precision)
 - Customer service
 - Exterior finish and housing
- However, transition cushioned by profits from conventional machines for some firms



Important Role of Competition in Process

- Intense competition in market forcing firms to invest in capabilities; rising performance thresholds
- Entry by new JVs, WOS and private firms
- Industry shakeout underway
 - # of firms in sector fallen in half
 - Exit
 - M&A activity
 - Rising concentration at the top; largest firm now producing ~4,000 CNC machines
 - Out of the 100+ domestic firms producing CNC machines, handful may become important international players



Summary

- Impressive increases in output and labor productivity last 25 years
- Inter-connected upward shifts in capability, wages, and skill content of output and exports
- Focus on process of growth rather than quantitative
- Role of marketization, entry and competition; also international links in upgrading of skills
- Gains achieved by both FIEs and domestic firms
- Heterogeneity across sectors and regions, and within sectors, among firms, which reflect:
 - Industry characteristics
 - Legacy of plan era development
 - Global technology
 - Extent of FDI
 - Govt intervention and policy
- Considerable forward momentum, however future growth tied to continued reform, upgrading and consolidation