

# Technology & Productivity Concept Note: A Multi-Disciplinary 'Look Under the Hood'

Joel Bell

## EXECUTIVE SUMMARY

There is a paradox of poor and declining aggregate national productivity, despite the development of new and ostensibly highly productive innovations in their individual deployments. Further, this is accompanied by highly uneven and, ostensibly, inequitable distribution of income. Increasingly, technology critical to national security/defense, to industrial economic strength and to security of supply at competitive unit costs all turn on competitive technological performance. Strength in each is essential to global influence.

Observed performance suggests that current technologies are not contributing all they could to community well-being and policy goals. Despite short term swings in overall productivity occasioned by the timing of innovation and capacity utilization, secular productivity and income distribution have been performing poorly for over a decade on productivity and for decades on income distribution. The causal factors to be examined by this initiative ('the Project') are seen as:

- Market power or dominance of a few suppliers blunts the pressure, extent and timing of the roll-out of new capacities and efficiencies; and, the monopsony power accords these same relatively few dominant firms significant advantages; and favors capital over workers. Growing income disparity reduces demand as higher income-earners spend less of their incomes, further reducing demand for workers and, hence, wages. Both domestic and external political attitudes reflect a consequent malaise and economically counterproductive nationalism.
- Community resistance to initial job displacement from automation and trade - and insufficiency of socio-economic policies and resources for education, training and adjustment. These limit market entry, dissemination of productive advances, and the availability of skilled personnel to capture productive new job opportunities and productivity. Long lead times for the wide implementation of new technologies does give time for policy to adjust.
- Unattributed costs may well exist in the system. The true full-cycle aggregate costs are inevitably captured in data and economic activity, while their allocation to a particular installation or technology may be overlooked. At least initially, those involved may fail to completely anticipate or attribute costs to specific individual deployments that nonetheless undermine aggregate productivity gain. Integrating legacy systems (so-called "technology debt"), unanticipated rejects and downtime - all add to technology innovation costs that are often not built into, at least early, specific technology assessments. This phenomenon is different and distinct from unmeasured productivity impacts from new offerings, both positive and negative, as a result of their not being priced separately. Measurement of productivity calls for more attention.
- **Geopolitical tensions and risks** displace economically optimal investment, as seen currently in the debate regarding China's role in supply chains.

The fundamental technology question is that of whether the inherent characteristics of contemporary technologies (e.g., economic impacts of digital services and their economies of scale and scope; pace of development/obsolescence; unmeasured convenience and features), or market conditions and policy, cause adverse productivity and income distribution consequences. Might different design parameters permit the reshaping of results without productivity

performance penalty? Are the answers different by the type of technology, sector of application and the use and combinations in which new technologies are deployed? The ultimate policy issues are:

- What stimulates technological development and innovation? what substitutes if competitive drivers, information and cross-fertilization - and even lessons from failures - are compromised by non-competitive, security or similar exemptions?
- o If technology reaching wide markets is delayed or limited - and, along with it the economic returns - how can the full productivity potential be realized? As market economies have long relied on competition for the motivation for innovation and efficiency, what replaces it and the surveillance it has provided for public interest?
- The exemption of some technologies from policies and practices designed for economic optimization, because the technologies that are argued to be too important for security and defense, removes them from economic and physical optimization. Technology policy and restriction of trade almost always retard the dynamics of development and competitive influence of dissemination and compromise economic optimization and productivity.
- o By what criteria, with what selectivity and with what disciplines is economic optimization replaced as the policy driver?
- o How can this be managed effectively with the degree of international rivalry and the intermingling of R&D funding, development and deployment of contemporary platforms and applications technologies?
- These same economies have also relied on temporary legal protection of intellectual property monopoly (that retards technological development and competitive dissemination, despite its combination with compulsory disclosure and the fact of some competitive 'inventing around'). Can fixed periods and degrees of such protection optimize results, given the variability of circumstances of different technologies and markets?
- o If not, what are alternative policy tools?
- o How much, functionally and political reliance should be placed on anti-trust enforcement - or, with what adaptations of remedial methods, in view of contemporary technologies, might that be promising?

In addressing these questions, it is well to reflect on: the facts, costs and tendencies consequent on a security exclusion; small percentages represent very large absolute money sums in many relevant matters; 'big tech' exercises political influence alongside its economic power; and the fact that many of the required assessments are not, by their nature, precise in either cause-and-effect or quantum. Both productivity and geoeconomic/geopolitical consequences turn on the answers and remedies. In fact, technology policy is a central element of international rivalries and a topic for the CSIS-Chumir Global Dialogue.

That disparate income distribution, beyond productive market supply/demand allocation of resources, results from the same four factors as productivity underperformance, suggests an unexploited, even unrecognized, convergence of interests of workers and investors might be found in policies regarding:

- rebalancing of labor power (collective bargaining rights; labor standards of minimum wage and unemployment entitlements);
- skills development and job/worker matching at higher productivity and incomes (education, training, adjustment assistance);
- productivity assessment on fully-allocated, true costs and convenience (avoid arbitrary tax favoring of technology/capital; review full-cycle costs and productivity measures);
- mitigation of geopolitical distortion of investment (technology policy; and co-existence dialogue). A more extensive description and work plan is available.