

Supplementary file: Building systemic resilience, productivity, and wellbeing: A Mental Wealth Perspective

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Expanded Table 1: Recommendations for building economic and business resilience.

Recommendations	Priorities
Invest in Brain Capital	<p>a. Build an innovation system and close the productivity distribution gap: The productivity slowdown across advanced economies is said to reflect not only a general decline in disruptive research and innovation (1) but also a growing gap between a relatively small cohort of high productivity, high skill ‘frontier firms’, which are constantly innovating, and a much larger group of low productivity ‘laggard’ firms, which have adapted to ‘business as usual’ (2). The case of Australia is instructive. Despite its outward appearance of economic resilience, the achievement of decades of continuous growth in GDP has been built on a fragile base. Its narrow trade and industrial structures are particularly narrow (3). While most businesses are not focussed on new-to-the-world innovations, an emphasis on supporting diffusion and uptake of business innovation could have broad productivity benefits (4) (Volume 5) as well as enhance mental capital and transferable skills.</p> <p>While the causes of the productivity slowdown continue to be subject of much debate, one thing is certain; it cannot be reversed without a massive increase in investment in research and innovation in the context of well-designed and purposeful national policy. Many countries have treated post-pandemic reconstruction as an opportunity for such investment, including the Biden administration in the US which is emulating the German Fraunhofer system in moving beyond the traditional linear ‘lab to market’ model of commercialisation to the development of ‘innovation ecosystems’ (5). Countries like Australia can reduce the fragility of their economic success if they pursue such an approach to achieve industrial transformation and the development of a more inclusive and dynamic knowledge-driven economy (6). Innovation is the key to greater resilience for businesses and workers in increasingly competitive global markets and value chains.</p> <p>Cognitive and relational competencies (interpersonal communication, teamwork, leadership) have always been important for ensuring best use is made of technological advances. Increasing levels of automation of nearly all aspects of production and shifts towards a knowledge-based economy make skills of this nature even more important (7-9). Productivity frontier firms (those in the top 10% of the productivity distribution) are up to eight times as productive as the least performing firms and have almost double the proportion of high skilled workers (8). Adjusting the skill structure (i.e., industry specific proportions of high, medium, and low skilled workers) to resemble frontier firms and enhancing the complementarities between manager and worker skills were on average estimated to deliver the largest gains in reducing the productivity gap (8). Achieving this in the current climate of substantial skills shortages will require innovation in vocational education and investments in building the mental capital of workers and retaining them.</p> <p>b. Innovations in vocational education and reinvestment in workforces: With automation taking over routine tasks and changing the nature of work, workers in both advanced and developing economies will need to possess more advanced skills, such as technological know-how, problem-solving, critical thinking, perseverance, collaboration, and empathy. The World Bank’s World Development Report on the Future of Work suggested that in countries with the lowest human capital investments, the workforce of the future will only be one-third to one-half as productive as it could be if people enjoyed full health and received a high-quality education (10). To become less vulnerable to impacts of productivity declines and skills shortages greater collaboration is needed between employers</p>

	<p>and educators to create a workforce that is adaptable to changing circumstances by mastering quality, transferable vocational skills (11, 12). For example, current labour markets and vocational education providers treat customer service, carer, and administrative support roles as unique domains of work. However, creating occupational structures that deepen transferable skills would enable people to move more easily between such related domains of work as opportunities rise and fall in different parts of the labour market (11, 12). Once core domain expertise and foundational capabilities that enable transferability of skills has been achieved, micro-credentialing has the potential to facilitate the transition between education and employment (13), promote employee upskilling and flexibility as the nature of work evolves, and improve access to education among disadvantaged populations (14). The shift to a focus on maximising shareholder value from the 1980s saw a re-allocation of company resources away from investment in building the mental capital, wellbeing, and productive capabilities of workers and towards more extractive practices that enriched investors (including company executives) such as stock repurchasing (15). Over the period 2004-2013, publicly listed companies on the S&P 500 bought back US\$3.4 trillion-worth of shares, equating to 51% of net income (15). This shift from a “retain-and-reinvest” to a “downsize-and-distribute” strategy is said to be largely responsible for rising income inequality, employment instability, and an erosion of innovation capacity seen since the 1990s (15-17). Companies will need to fashion a new social contract that reinvests in their workforces and provides workers with opportunities to engage in collective, stable, and cumulative learning over the course of their careers to reverse the destructive effects of the company resource re-allocation trend of the last 30 years.</p> <p>Under a narrow economic frame, ageing populations are also seen to present a potential productivity challenge (18). Research from Europe has shown that a 1% increase in the employed population aged 55 – 64 years is associated with a decrease in the productivity growth rate of approximately 0.1% to 0.5% (19). The so-called ‘issue of ageing populations’ is widespread and ongoing in nearly all of Asia (20). Researchers propose that the impact of ageing on productivity depends on the structure of the economy with more advanced, knowledge-based economies (dependent on accumulated mental capital, and relational and communication skills) being less exposed than those with a greater economic activity in labour-intensive sectors (19, 21, 22). Therefore, rights to further education in new domains of expertise as well as micro-credentialing contributes to an ecology for lifelong learning (23). This will be important for supporting transitions to knowledge-based economies and to maintaining productivity in the context of an ageing population and workforce. In addition, establishing workplace structures to foster intergenerational knowledge exchange will play an important role for both the adoption of innovation among older workers and the upskilling of younger workers. However, this narrow economic frame fails to recognise the changing nature of contributions made to society over the course of a person’s life. While the declining productivity of older adults in the formal economy is seen as a ‘productivity challenge,’ the Mental Wealth frame demonstrates that their contributions to social production are substantial (24).</p> <p>c. Invest in Brain Health Living Labs: Through public-private-people partnerships, Brain Health Living Labs would integrate contemporaneous clinical care, transdisciplinary research and innovation processes, expediting the development of well-designed, evidence-based brain health solutions across the lifespan (25, 26). Research and innovation should be inclusive of, but extend beyond clinical trials, to include the exploration of the most effective models of care, implementation strategies, and mental health system design. They should also focus on developing models of care aimed at improving social, vocational, and educational functioning (beyond only symptom reduction) and successful transitions to work (27).</p> <p>d. Fostering collective intelligence: Collective intelligence is an under-valued potential source of productivity and innovation. Based on the notion of ‘The Wisdom of Crowds’ (28), collective intelligence is the intelligence that emerges from group collaboration</p>
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	<p>that extends beyond the intelligence of individual group members. Collective intelligence has been shown to predict competitive performance in diverse settings, with the group interaction process being overall more important than the skill of individual group members (29-32). Gender composition of teams has emerged as a key influencing factor with collective intelligence positively correlated with female participation (31). In the post-pandemic era, business needs to move beyond a short-term focus on incentives to boost individual worker productivity and make longer-term investments in brain capital and the creation of work environments that foster collective intelligence as a pathway to enhancing innovation and adaptation.</p> <p>e. Revitalising the foundational economy: The COVID-19 pandemic reminded all societies of what was important in economic and social life. Even in lock-down certain sectors were exempt because societies cannot function without them. They were health, education, the food supply chains, and utilities (especially telecommunications). The pandemic also highlighted the importance of quality in essential social services – especially aged and disability care. Poor quality provision of such care was associated with some of the highest COVID-19-related death rates in many societies. Even before the pandemic a range of researchers had identified the importance of these sectors – what they describe as the Foundational Economy - as domains that provide the infrastructure for everyday life (33). Initiatives in innovation systems, vocational education, brain health living labs, and more effective approaches to collective intelligence can only achieve so much in isolation. To deepen Mental Wealth, they need a solid anchor in the form of an effective and robust foundational economy. For the last thirty years, programs of large-scale experiments with outsourcing, compulsory competitive tendering, and the creation of quasi-markets in education and human services have steadily hollowed out the quality of the infrastructure of everyday life (34). Unless the foundational economy is strengthened, the above initiatives will have limited impact. Just as a house built on sand may look good initially, flawed foundations will ensure anything built atop will falter.</p>
<p>Programs to guard against mass unemployment</p>	<p>Mass unemployment as a result of large-scale natural disasters, pandemics, financial crises, civil disruption, etc. has devastating effects on the social fabric of nations, on the vocational and educational potential of young people, and on the cognitive and emotional resources that underpin productivity and future national prosperity. Even when economies recover, mental capital depreciation (dependent on the duration of unemployment and the extent of former and new occupational mismatch), social dislocation, and mental health outcomes resulting from the mass unemployment event can have lasting effects, incurring significant losses to a nation's productive potential and social prosperity. Traditionally, increasing physical infrastructure investment has been a key strategy of governments to stem the rapid deceleration of productivity and stimulate the economy. However, this strategy doesn't prevent the damage from mass unemployment. It merely aims to reduce the duration of the downturn and benefits some sectors over others.</p> <p>During the COVID-19 pandemic, governments of Australia, Germany, France, Italy, Japan, the US, and others proactively responded to prevent mass unemployment through job retention programs. These programs preserved the connection of workers and employers by maintaining viable jobs during the temporary reduction in business activity. They buttressed aggregate demand by supporting incomes of workers on reduced hours (35). By May 2020, an unprecedented 50 million jobs across OECD countries were supported by such job retention programs (35). Even prior to the pandemic several countries already had short-time work (STW) schemes in place that provided support to individual businesses facing temporary declines in demand but considered viable in the medium term. These schemes help to avoid the costly process of separation, re-hiring, and training, reduce aggregate job destruction rates and deadweight losses, and improve the likelihood of business survival (36, 37). Beyond the benefits to business</p>

	<p>and the economy, job retention schemes during the pandemic likely acted to reduce the mental health corollaries of unemployment. In Australia, systems modelling of the impact of the pandemic on mental health estimated that the employment retention program, JobKeeper, will have contributed to the prevention of 469 suicide deaths, 4,226 self-harm hospitalisations, and 51,490 mental health-related ED presentations over the period 2020-2025 and represented the single most effective mental health intervention among the programs modelled at the height of the pandemic (38, 39). However, economic downturns do not affect all groups equally, being particularly harsh for those reliant on casual work, those developing new skills, and those without accumulated assets, experience, or independent social networks. Job retention schemes should include these most vulnerable groups. A corporate co-contributions program could be considered to support the funding of such schemes.</p> <p>It is also important to note potential drawbacks of a universal application of job retention schemes during significant economic downturns in achieving progress towards a productive Wellbeing Economy. Economic downturns have been known to catalyse creative destruction in the economy to achieve progress towards new goals. For example, travel restrictions and lockdowns during the COVID-19 pandemic drastically reduced overall global energy demands due to reduced commercial and industrial sector activity, while domestic consumption increased significantly (40). The economic crisis that accompanied the pandemic therefore provided a window of opportunity to hasten the transition towards renewable energy sources (40). More broadly, recessions have been associated with an increase in the share of renewable energy particularly in countries with stringent environmental protection regulation (40). Therefore, the green transition has required several fossil-fuel intensive industries to decarbonise with the loss of associated jobs in favour of green jobs. While difficult trade-offs may therefore need to be made regarding the implementation of job retention schemes, appropriate planning for a resilient transition in such cases can support workforce reskilling rather than requiring recession to catalyse a step change to new goals in society's best interest.</p>
Foster social productivity	<p>Technological disruption and the changing nature of work also requires rethinking the social contract. We need new ways to invest in people and to protect them, regardless of their employment status. Yet four out of five people in developing countries have never known what it means to live with social protection (41). With 2 billion people globally already working in the informal sector, unprotected by stable wage employment, social safety nets, or the benefits of education, new working patterns are adding to a dilemma that predates the latest innovations (41).</p> <p>Given the detrimental impacts of income insecurity and unemployment on brain capital and national productive potential, the past decade has seen increasing calls for initiatives to prevent deprivation and enforced idleness, such as the Universal Basic Income (UBI) and the Job Guarantee (JG). The UBI is a government safeguard to ensure all citizens can receive unconditionally a liveable income as a means of eliminating income insecurity and preventing poverty (42). These sorts of unconditional cash transfers have been found to positively impact mental health, wellbeing, and intergenerational rates of substance use (43). However, critics of the UBI fear that it is inherently inflationary (44), and its lack of connection to productive activity may act as a demotivator to participation in society, potentially undermining social cohesion and exacerbating social decay (45). In contrast, the JG is a commitment to achieving full employment where governments act as an employer of last resort and provide full-time or part-time jobs to everyone that desires one with an income at the level of a living wage (46). This is said to create a fixed-wage 'buffer stock' of workers (as opposed to an unemployed buffer stock) that expands and declines based on private sector demands (47). However, critics of the JG argue it represents a massive expansion of government, that it will interfere with the functioning of free</p>

	<p>markets, that it would create large, inflexible, inefficient public programs, and that it would present substantial operational challenges (48, 49).</p> <p>A Participation Wage represents an alternative to a UBI or JG. The Participation Wage is similar to the JG in that it provides a living wage to those that are unemployed, underemployed, or not participating in the formal economy, but are participating in socially productive activities (50). As mentioned previously, such activities could include volunteering and charity work, contributions to community groups, educating and caring for children, care of the sick, elderly or disabled, informal mentoring, environmental restoration, building social infrastructure such as facilities, spaces, services and networks, and any activity that is currently unpaid, socially valued, and contributes to strengthening civic life (51). There are several advantages of the Participation Wage; (i) it would strengthen the systemically under-resourced community sector, (ii) rather than government determining the parameters of available work, it is driven by the nature of social contributions that people deem to be most meaningful to them, (iii) it represents a shift in the meaning of work that is more inclusive, (iv) it is far more flexible in being able to respond to the dynamics of social, economic, and environmental change, and (v) it would alleviate those concerned about the expansion of an alternative public sector market that competes with private industry. The Participation Wage is not a welfare payment, it is an investment in social productivity, which has benefits for economic productivity and contributes to multi-sector resilience. From the perspective of an aging population, the Participation Wage would provide an alternative or supplement to the aged pension and incentivise continued social participation in retirement, delivering transgenerational benefits and a maintenance of mental capital, mental health, and collective wellbeing.</p> <p>The participation wage would not be available to those in full-time employment; however, tax incentives could be provided to those that make social contributions in addition to participating full-time in the formal economy. Finally, compliance measures for the Participation Wage should reflect standard operational requirements of tax systems i.e., self-assessment subject to auditing, rather than the draconian compliance rules of current welfare systems (50). In addition, tax incentives could be offered to promote private sector investments in the opportunity structures that enable social productivity and social connectedness such as facilities, spaces, services, and networks. Civic infrastructure broadens participation and provides a foundation for inclusivity, trust building, and a shared sense of responsibility, without which, other more polarising interests ‘will fill the vacuum’ and undermine resilience (52-54).</p>
<p>Establish a legal framework for resilience</p>	<p>The Mental Wealth perspective on economic resilience focuses on building brain capital and the infrastructure to support economic and social productivity to enable a system to anticipate, absorb, recover from, and adapt to a wide array of systemic threats. However, the extent to which cross-system resilience is considered an essential state of being will determine the appetite for legislative changes to secure it. For example, in a number of countries electricity systems are resilient by law with reserve capacity mandated should threats to national or local systems arise (54). Similarly, a legal framework to support a universal, guaranteed minimum level of social productivity and social capital infrastructure would better secure this essential source of surge capacity to respond to local, national, and global threats.</p> <p>The pandemic provided a compelling case supporting the argument that governments have an ethical mandate to intervene to protect individuals and populations at risk of demonstrable harm, whereby the failure to act would result in increased levels of illness and health inequalities, and social deterioration (55). However, imposing obligations on individuals to curtail their activity to protect the best interests of others can put public health law at odds with human rights law (56) and may not be particularly</p>

	<p>effective in countries that give primacy to individualism over collectivism. The pandemic demonstrated the anti-government sentiment and civil unrest that can manifest where individualised and polarized communities meet with the implementation of legal instruments to curtail individual freedoms, even temporarily (57). Therefore, legislative changes may best be focussed on reforms such as ending unhelpful subsidies, improving labour market regulations, globally overhauling taxation policies, and more broadly re-designing social and economic structures to better support economic resilience, reduce inequalities, enhance social cohesion, building trust and a sense of shared responsibility. Enabling a nation's Mental Wealth to flourish requires collaborative efforts of a complex network of people and organisations in the public and private sectors, as well as an alignment of policy and practice of governmental agencies at the national, state, and local levels. In this sense, the law is an essential tool for creating the conditions to support business resilience and the social conditions that would empower people to lead healthier and safer lives (55).</p> <p>In addition, just as environmental, social, and governance (ESG) frameworks need to add health and wellbeing to their focus (58, 59), a resilience framework would prioritize brain capital. It would also recognize the essential reskilling and upskilling requirements that are needed to help individuals and organizations adapt to a changing world. This framework would encompass an adaptive supply chain, with technology serving as an enabler, and deploy financial and fiscal buffers as defensive supports within an overall proactive stance.</p> <p>Inaction is always more costly than prevention. A resilience legal framework would foster the cooperation of public and private sector organizations in supporting sustainability and inclusiveness across societies. For companies, resilience will translate into sustainable business growth, while for societies, resilience both enables and depends on inclusive and sustainable economic prosperity emphasizing improved quality of life. By prioritizing brain capital, by fostering cooperation between public and private sectors, and by promoting resilience thinking at multiple scales (organisational, community, regional, national), a resilience legal framework could help build a more resilient, stable, and secure world for all.</p>
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