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Agglomeration effects and housing market dynamics

From the AHURI Inquiry: Inquiry into population growth, migration and agglomeration

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Executive summary

Key points

This project aims to quantify productivity-related agglomeration benefits arising from the concentration of employment in Australia. Agglomeration of firms and employment reduces the impact of distance on the exchange of goods and services, skills and people, and ideas and information. Concentration of firms and employment can thus lead to spatial variation in productivity.

Our measure of productivity is individual wages. We control for individual and firm-specific characteristics. Agglomeration benefits are examined across the wage distribution, as well as before and after adjusting for basic housing costs (mortgages and rents). Our key agglomeration measure is concentration of employment (or employment density). We also include employment in nearby locations, urbanisation economies and localisation economies.

- Our estimates suggest that a doubling of employment density raises hourly wages by 1 to 4 per cent. While agglomeration has a positive effect, individual and firm characteristics are the key determinants of spatial variation in wages.
- Localisation (industry specialisation) and urbanisation (diversity of industry) economies also generate agglomeration effects and will be critical to the evaluation of population and employment dispersal strategies and aims. Broadly a doubling of economic specialisation, relative to the state as a whole, is associated with a further 4-10 per cent higher hourly wage level.
- Analysis of agglomeration benefits across the wage distribution reveals considerable variation. Lower-wage earners benefit less from agglomeration than higher-wage earners.

- **The wage premium typically remains also after adjusting for basic housing costs (mortgages and rents). However, agglomeration benefits are substantively capitalised in housing costs for the lowest 20 per cent of earners. The net benefit for middle-income earners also appears less than for higher-income earners.**
- **Housing markets potentially exacerbate inequality by distributing gains from agglomeration from lower-wage earners to property owners—although the total effect is likely mitigated by transfer payments and rent assistance.**
- **Housing market policies that reduce this distributive role *may* have additional productivity-enhancing effects by incentivising investment in productive capital, new technology and infrastructure.**
- **The results in this report highlight the role that housing markets and affordability play in distributing gains from agglomeration. The implication for urban transitions is that housing policy and affordability are key to harnessing agglomeration benefits at the societal level.**

Most Australians live in cities. Barring a continuation of the COVID-19 pandemic, our urban populations will grow considerably over the next few decades. Cities enable agglomeration benefits through the proximity of workers and firms. They also typically have:

- higher house prices—which reduce entry and ongoing affordability
- greater pollution and other wellbeing detriments—such as crime, noise etc.

Like many other nations, Australia has experienced declining productivity over the last few decades, has an ageing population, and is facing significant climate, technological and urban transition challenges.

Recent policy directions, such as the Australian Government's 2019 *Planning for Australia's future population* and Infrastructure Australia's 2018 *Future cities: planning for our growing population* highlight the role of urban economies in enabling future prosperity. In a post-COVID-19 environment—where teleworking has, at least temporarily, become endemic for some types of employment and occupations—the relationship between agglomeration, productivity and housing markets remains particularly important for enabling future prosperity. This study quantifies wage-related agglomeration benefits and assesses these relative to basic housing costs (mortgages and rents) and distributional differences across the income distribution to inform strategic decision-making around urban form and density.

This report is part of the AHURI Inquiry into Population Growth, Migration and Agglomeration. The aim of the Inquiry is to interrogate Australian and international evidence on the range of costs and benefits associated with agglomeration economies, when these effects may arise, how they might change with city scale, and how they might depend on spatial context.

The overall research question for this report is:

How do jobs and skills concentration affect labour productivity and housing costs in Australia?

Within this, the report is structured along three research questions:

- **RQ1:** What is the relationship between agglomeration effects and housing market dynamics? (Section 2)
- **RQ2:** To what extent is labour productivity in Australia a function of agglomeration effects? And do agglomeration effects differ across skills and/or income groups? (Section 3)
- **RQ3:** To what extent do spatial wage differences reflect spatial variation in housing costs? And do housing market effects vary between high- and low-wage earners? (Section 4)

Key findings

Relationship between agglomeration effects and housing market dynamics

This study is informed by the urban economics literature around agglomeration economies and housing. Employment density is frequently accompanied by higher housing costs. Thus, housing costs, in addition to wages, also serve as an indicator of agglomeration economies. Residential location decisions and property price formation are multifaceted. Property prices are typically a function of:

- local supply conditions—such as planning or political economy
- households' preferences for living and working in different locations—access to employment, access to urban amenities, local networks and attachment to place.

Agglomeration effects potentially affect each of these.

- First, an urban surplus is generated where agglomeration results in greater productivity. In turn, businesses benefit more from each worker. They may therefore use some of the urban surplus to offer higher wages to attract labour. Higher wages compensate households for urban inconveniences—such as higher housing costs, crowding and pollution—which results in additional population growth. Alternatively, more productive workers may self-select into cities, in which case the urban premium is partly a function of self-selection, rather than wage-related agglomeration effects. Workers, incentivised by higher wages, bid up the price of housing to secure access to more productive localities (higher wages). If benefits from agglomeration are conditional on specific worker characteristics—for example, skills in limited supply—then housing market outcomes for lower-skilled and higher-skilled workers may differ.
- Second, cities can also provide consumption amenities that—either independently, or in addition to wages—increase households' preferences for living in cities, and in specific parts of cities. For instance, larger cities often provide a diverse mix and choice of schools, hospitals, restaurants, bars, shops, sports facilities, music, theatres and museums, which can influence liveability and self-selection into particular cities, or into areas within those cities. If urban consumption amenities compensate households for urban inconveniences, then housing affordability may continue to worsen independently of changes to wage distributions or wage increases. Also, urban amenities may be a function of agglomeration, with concentrations of households generating market scale to sustain a greater variety and diversity of consumer offerings (local goods).

- Third, agglomeration benefits arise out of proximity—that is, reduction of costs associated with distance. Digital connectivity and automation may provide a means of substituting physical proximity for digital connectivity. For instance, economies of scale relating to marketplaces can thus be captured through digital geographies, rather than physical geographies, which enables more decentralised or regional economic development. At the same time, changing the need for physically anchored employment locations will likely alter the geography of housing demand. This may lead to some regionalisation of residential demand. However, where urban amenities and lifestyles are an integral part of the location decision, this will increase demand for housing in high-amenity cities or parts of cities. Domestic and international research on the spatial impact of automation suggests that outer parts of capital cities and smaller cities may be more affected than inner parts of capital cities.

Labour (wage) productivity and agglomeration in Australia

Hourly wages (hereafter hourly wages or wages), as a proxy for the productivity of labour, are determined by the interaction of a range of factors:

- individual 'human capital' (such as education, skills, attributes), gender, demographic factors
- firm and industry-specific factors—products/services, public/private
- institutional factors—collective bargaining, contract status, regulation.

These factors are expected to determine variation in wages separately from any agglomeration effect.

Agglomeration effects, such as employment density, market potential, urbanisation economies and localisation economies, have the potential to raise the productivity of labour (and thus wages) in addition to the individual, firm and institutional factors.

An assumption in the literature is that wage differentials reflect differences in workers' marginal product. Wages are thus a proxy for capturing labour-related agglomeration effects—this is despite their being an imperfect tool, as agglomeration effects may be reflected in housing costs and amenities (Rosenthal and Strange 2008). Agglomeration economies have the potential to enhance overall productivity through scale and network effects that:

- reduce the costs of intermediate inputs and labour
- allow for better matching of skills (labour) to jobs
- enable knowledge and information flows within and between different economic sectors (spillovers).

The labour productivity-related wage-agglomeration effect can be isolated in wage differentials—when controlling for individual, firm and industry—and institutional determinants. In this report we identify agglomeration effects using four measures common in the literature. The key measure is employment density where the individual works. In addition, we control for employment in nearby locations (market potential), urbanisation economies (economic diversity) and localisation economies (economic specialisation). We estimate agglomeration effects with SA2 and SA4 level agglomeration inputs at postcode level (hereafter SA2/SA4 level inputs). The key findings are outlined below.

- Employment density (or agglomeration) is significantly associated with higher hourly wages and thus productivity. However, these wages are in addition to individual, firm and institutional factors that explain the largest part of wage variation in Australia. Specifically, our modelling suggests that after controlling for individual and firm, institutional factors, a doubling of employment density will increase the productivity of labour by 1 to 4 per cent. This is in line with international evidence, but somewhat lower than earlier Australian estimates. Point estimates with small area levels (SA2 level input) are marginally lower than point estimates at larger (SA4 level input) levels.
- There is some evidence that proximity to nearby employment concentration has a positive impact on the wages of higher-income earners with SA2 level inputs, but this effect appears to disappear with SA4 level inputs. Spillovers in this respect capture interdependencies between areas. The average spillover effect is insignificant. The marginally higher productivity-point estimates with SA4 level inputs, and the absence of spillovers, suggests that agglomeration benefits are spatially contained.
- Overall, agglomeration benefits appear to be greater for higher-wage earners than lower-wage earners. There are thus clear distributional effects arising from productivity-enhancing agglomeration effects.

- There is some evidence of urbanisation economies—that is, wage benefits arising from a diversified economic structure with SA4 level inputs. However, the effect is again stronger for higher-skilled earners, and only marginally significant for all earners.
- The evidence of localisation (specialisation) economies is stronger, both with SA2 and SA4 level inputs. Areas with more spatially concentrated industries tend to experience additional wage benefits. Outside of mining industries, spatial concentration appears particularly relevant for 'Information Media and Telecommunication', 'Financial and Insurance Services' and 'Arts and Recreation Services'. Broadly a doubling of economic specialisation, relative to the state as a whole, is associated with a further 4-10 per cent increase in wages. However, the degree of economic specialisation differs substantially for different sectors of the economy, and further research is required to more robustly identify which sectors specifically benefit from concentration.

Agglomeration and housing cost

In Section 4, the modelling adjusts wages for basic housing costs to control for the cost-of-living adjusted wage element. That is, compensating workers for higher housing costs. However, housing costs are not the only congestion costs that might arise with agglomeration, as commuting costs directly affect an individual's locational choices and benefits from agglomerations.

Basic housing costs include mortgage and rent payments, but exclude transfer payments (benefits) or income support payments (such as Commonwealth Rent Assistance [CRA]). Transfer payments and income support potentially mitigate some of the distributional and housing market impacts of agglomerations. From an analysis perspective, however, they also potentially disguise the relationship between agglomeration effects and housing market dynamics. The area-based measures used in this research to isolate the effect of basic housing costs, are tested where individuals work and where individuals live. The key findings in this section are as follows.

- The positive and significant agglomeration effect remains after adjusting for basic housing costs. However, there is also some evidence that part of the urban premium is absorbed by higher housing costs. Overall, this is the case when considering employment agglomeration at both the place of work and the place of residence, although the results are more pronounced when examining housing cost-adjusted wages at the place of residence. On average, therefore, workers benefit from working in denser employment concentrations also after considering the higher housing costs in denser agglomerations. This does not include other congestion costs, which may also be higher in denser agglomerations.
- Quantile regressions reveal that higher-wage workers benefit more from employment agglomeration than lower-wage workers, also after adjusting for basic housing costs. For the lowest 20 per cent of the wage distribution, productivity gains are substantively capitalised in housing costs, and middle-income earners also benefit less than higher-income earners. This effect becomes particularly pronounced when analysing housing cost-adjusted wages at the place of residence. In this case, the lowest half of employees receive little net wage benefit from agglomeration effects. Differences across the wage distribution suggest that housing markets play a significant role in redistributing the gains from agglomeration to higher-wage earners and property owners. Importantly, the residential location–higher-housing-cost outcome may also reflect non-wage benefits, such as access to urban amenities that increase the willingness to pay for housing in locations closer to employment agglomerations.
- Quantile regressions also show that the residential location of lower-wage earners is substantially more responsive to commuting costs than higher-wage earners'. Higher commuting costs are thus likely to affect the residential locations of lower-wage earners more than higher-wage earners, and lead to additional residential concentration of lower-wage earners close to employment concentrations.

Policy development options

Recent policy directions highlight the role of urban economies in enabling future prosperity. *Future cities* (Infrastructure Australia 2018) and *Planning for Australia's future population* (Australian Government 2019) set out a number of urban and regional development considerations about urban form, population distribution and impacts of technological innovations on economic geography. The widespread uptake of technologies enabling teleworking during the COVID-19 pandemic—for some types of employment and occupations—has accelerated some of these considerations, particularly relating to urban form and population distribution.

The results in this report also relate to productivity, including the importance of a place-based policy agenda to support economic and social development, beyond major cities (Beer, McKenzie et al. 2020). The findings in this report also highlight significant housing affordability, productivity and equitability gains to be made by understanding the link between agglomeration and housing markets over time.

- Clustering of employment and economic activity generates agglomeration benefits. Concentration of economic activity, rather than dispersal, thus generates a greater productivity dividend. However, there is little evidence of non-linearity in agglomeration effects. In other words, agglomeration can potentially be replicated elsewhere. There will, however, be transition challenges in building up new agglomerations and there is a need to carefully consider scale, composition of productivity sources and variation in agglomeration benefits across the wage distribution.
- Digital connectivity and automation potentially reshape the effect of physical distance. This means that some agglomeration effects can still be harnessed without physical proximity. The development of digital marketplaces and spaces potentially provides market scale, without physical proximity to customers. Digital connectivity and automation reshapes economic geography and, for some individuals and households, enables residential location decisions free from proximity to fixed places of employment. This will invariably generate some decentralisation, as well as some increase in demand for amenity-rich urban locations.
- Housing policy and affordability are instrumental in distributing and harnessing productivity benefits in the short-term and long-term. Thus, housing policy is critical to economic policymaking. The agglomeration benefit that is paid out in higher wages is, for some lower-wage earners, substantially capitalised in higher housing costs. This has significant distributional impacts. It also carries public costs in the form of higher CRA payments. In the long-term, this potentially has productivity-inhibiting effects through incentivising rent-seeking rather than productive investment.
 - Regional development (or population growth decentralisation) needs to be complemented with physical and digital infrastructure investment, economic diversity, economic specialisation, skills development and housing supply to enable productivity gains. It may also need to be complemented with 'lifestyle' and social-infrastructure investment to be self-sustaining, although some of these will likely arise with income growth.
 - Increasing housing supply close to centres of employment needs to be complemented with planning and regulatory incentives that provide appropriate, affordable and sustainable housing options, and that protect public and private green spaces. However, density of employment and population may also generate additional non-wage-related agglomeration benefits—such as amenities and lifestyle—that, in turn, generate demand for housing options close to agglomerations.

To harness societal benefits from agglomeration effects, an overarching policy goal should be to ensure earners benefit across the wage distribution, while also ensuring that both lower-skilled and higher-skilled workers can live affordably and sustainably. Housing policy is key, and can include:

- Support for the direct provision and supply of affordable dwellings, including within precinct developments and private rental support packages close to major employment hubs and within direct access to transport. This may counter effects that exacerbate inequality and, in the longer-term, counter rent-seeking behaviour related to land use and development.

- An active strategy that provides incentives for businesses and employers to facilitate a more ‘permanent’ transition to teleworking—in other words, working from home—can have ‘social dividends’, particularly in the form of housing costs. However, teleworking is not equally feasible across all employment types and occupations. Therefore, there is a need to further investigate:
 - future scenarios associated with new ways of working and living
 - implications for residential locations, along with costs and options for different types of workers
 - implications for urban form and commuting patterns, for example, compact cities, and;
 - implications for service-related employment and entrepreneurial opportunities arising from income concentration—such as economies of scale, product diversity, specialisation, and division of labour.
- Individual wage determinants remain a critical supply-side factor in determining productivity. Greater and continual access to education and training – and pathways for current and new generations of workers – is critical to long-term prosperity, and as part of a post-COVID-19 economic recovery process. This may include providing incentives for regional students to access housing and training packages.
- Productivity is critical to long-term prosperity. However, inadequate employment protection and barriers to employment participation can erode productivity gains. In a context of digital transformations, automation and economic recovery, employment protection and participation are critical to reducing income and housing inequalities.

The study

This research is one of three projects in the AHURI Population Growth, Migration and Agglomeration Inquiry, which explore the relationship between agglomeration effects, productivity and housing dynamics.

A review of international and domestic literature on agglomeration theory, effects and urban impacts was conducted to explore how agglomeration effects are—or might be—related to the cost of housing in cities.

An econometric analysis based on HILDA Surveys (Waves 17 and 18) and ABS Census data (Place of Work-based) was then conducted to identify whether agglomeration effects (density, market potential, diversity and specialisation) are associated with higher wages (as an indicator of productivity), using SA2 and SA4 level Census data inputs linked to HILDA Survey postcode-area information on place of employment. Measuring postcode-area agglomeration effects with SA2 and SA4 level inputs provide a means incorporating spatial attenuation, but further research is required to more accurately identify spatial reach. The analysis was repeated to then test whether greater agglomeration of employment is associated with higher wages net of (after deducting) basic housing costs.



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