ppi

radically
pragmatic

The Rise of the Australian App Economy

Dr. Michael Mandel and Elliott Long
Progressive Policy Institute
June 2017

ppi

The Rise of the Australian App Economy

INTRODUCTION

When Apple introduced the iPhone in 2007, that initiated a profound and transformative new economic innovation. While central bankers and national leaders struggled with a deep financial crisis and stagnation, the fervent demand for iPhones and the wave of smartphones that followed was a rare force for growth.

Today, there are more than 4 billion mobile broadband subscriptions—an unprecedented rate of adoption for a new technology.[1] Use of mobile data is rising at 55 percent per year, a stunning number that shows its revolutionary impact.[2]

More than just hardware, the smartphone also inaugurated a new era for software developers around the world. Apple's opening of the App Store in 2008, followed by Android Market (now Google Play) and other app stores, created a way for iOS and Android developers to write mobile applications that could run on smartphones anywhere.

The iPhone and the App Store were the beginnings of a global App Economy: an army of app developers writing mobile applications for billions of users.[3] For the most part, these developers are not hobbyists writing games in their basements. Instead, as more and more people are linked to the Internet through their smartphone and mobile data connections,

mobile apps have become an essential way for businesses, nonprofits, and governments to interact with their customers, members, and citizens. (Indeed data shows that people spend most of their Internet time interacting with apps).

> **The iPhone and the App Store were the beginnings of a global App Economy: an army of app developers writing mobile applications for billions of users.**

Moreover, the long-term growth prospects of the App Economy are still strong. Yes, the great surge of new game, media, and ecommerce apps is probably close to its peak. However, the rise of the Internet of Things means that more and more objects and physical processes will be connected to the Internet.

Increasingly, individuals will be using mobile apps as their interface to their home, their travel, their entertainment, their car, their schools, their health providers, and their state and local governments. Employees in many enterprises are using mobile apps to monitor or control work processes. These apps will be highly functional and sophisticated, serving an essential role in interacting with our environment.

> **However, the rise of the Internet of Things means that more and more objects and physical processes will be connected to the Internet.**

THIS PAPER
This report on Australian App Economy employment builds on previous estimates of App Economy jobs around the world, starting with our February 2012 report "Where the Jobs Are: The App Economy."[4]

As of March 2017, we estimate that the Australian App Economy totals 113,000 jobs.

In addition, this paper estimates the number of App Economy jobs by state and as a percentage of all jobs on a state-by-state basis. Next, we provide an overall breakdown of App Economy employment by operating system, comparing the number of jobs in the iOS ecosystem with the number of jobs in the Android ecosystem. Finally, we compare our estimate here with a 2014 estimate of Australian App Economy jobs done using a somewhat different methodology.[5]

CONTEXT
In this paper we focus on App Economy employment in Australia. However, this paper is part of a larger research project examining App Economy employment in different countries and regions, including the United States, Japan, Europe, Mexico, Argentina, Colombia, Brazil, Vietnam, Indonesia, and China.

There are several reasons we have focused on App Economy jobs. First, the invention of the smartphone was one of the two most important technological innovations over the past decade, from the perspective of economic impact, so it's natural to want to know how many jobs it is creating.[6] These are not numbers that can be found in government statistics, which typically have trouble capturing the impact of new technologies.

The App Economy, because it doesn't fit neatly into the old economic paradigms, is particularly hard for traditional government statistics to measure. For example, statistical agencies that count exports have no category in trade statistics for the revenues generated by the export of domestically-created apps to other countries, even though these revenues may be very significant. Indeed, statisticians may not be counting these exports at all.[7]

ppi

> **The App Economy, because it doesn't fit neatly into the old economic paradigms, is particularly hard for traditional government statistics to measure.**

The other reason we have focused on App Economy employment has to do with the broad ongoing debate about the link between technological innovation and jobs. There's a pervasive worry, especially in the aftermath of the financial crisis, that new technologies destroy jobs without creating very many new ones.[8] So we see reputable business publications like Fortune and the Wall Street Journal run articles with titles like "Silicon Valley Is Not a Job Creator" and "Wireless Jobs Evaporate Even As Industry Expands."[9,10]

> **There's a pervasive worry, especially in the aftermath of the financial crisis, that new technologies destroy jobs without creating very many new ones.**

Unfortunately, government economic statistics are much better at tracking the reduction of existing jobs than identifying the growth of new types of jobs. For reasons of both budget limitations and inertia, it takes years for new occupations to get their own categories in the employment statistics, if it ever happens at all.

This lack of data made it harder to measure the employment impact of the Internet and the New Economy. Equally important, without being able to track new jobs, it's impossible to figure out if policies are succeeding or failing. Without data—specifically data about the contribution of the App Economy to individual countries—policy makers in Hanoi, Berlin, or Washington can't make the right decisions.

MEASURING THE APP ECONOMY

As the App Economy grows in size globally, it becomes essential to have a consistent set of App Economy job estimates so policymakers can compare their country's performance with that of other countries and the sorts of policy actions they took. For that reason, we have developed a new, standardized methodology for estimating App Economy employment. This methodology can be applied to a wide variety of countries, languages, and economic environments. The methodology uses online job postings for workers with app-related skills as a real-time measure of App Economy employment. We benchmark this data against official government statistics in order to eliminate many of the well-known problems connected with using big data to measure economic variables.[11]

Our goal is to produce a set of globally-consistent and credible estimates for App Economy employment by individual countries, by broad geographical regions, and by major cities. The ultimate objective is to be able to track the growth of the App Economy globally and to see which countries are benefitting the most. Ideally, we should be able to link App Economy growth to policy measures implemented by governments.

> **Our goal is to produce a set of globally-consistent and credible estimates for App Economy employment by individual countries, by broad geographical regions, and by major cities.**

This report on Australia's App Economy also examines the country's eight main states and territories.Our methodology is described in detail in the appendix to this paper.

DEFINING THE APP ECONOMY

For this study, a worker is in the App Economy if he or she is in:

- An IT-related job that uses App Economy skills—the ability to develop, maintain, or support mobile applications. We will call this a **"core" App Economy job.** Core App Economy jobs include app developers; software engineers whose work requires knowledge of mobile applications; security engineers who help keep mobile apps safe from being hacked; and help desk workers who support use of mobile apps.

- A non-IT job (such as sales, marketing, finance, human resources, or administrative staff) that supports core App Economy jobs in the same enterprise. We will call this an **"indirect" App economy job.**

- A job in the local economy that is supported by either by the goods and services purchased by the enterprise or by the income flowing to core and indirect App Economy workers. These "**spillover**" jobs include local professional services such as bank tellers, law offices, and building managers; telecom, electric, and cable installers and maintainers; education, recreation, lodging, and restaurant jobs; and all the other necessary services. We use a conservative estimate of the indirect and spillover effects, as discussed in the appendix. Later in this paper we will give examples of App Economy jobs.

To estimate the number of core App Economy jobs, we use a multi-step procedure based on data from the universe of online job postings. Our first observation is that online job postings typically describe the skills and knowledge being sought by the employer. For example, if a job posting requires that the job candidate have experience developing apps for iOS—the iPhone/iPad operating system—then we can reasonably conclude that the posting refers to a core App Economy job.

In practice, we compiled a short list of key words and phrases that would generally be associated with App Economy-related skills. These include "iOS," "Android," "Blackberry," "Windows Phone," "Windows Mobile," and "app." We applied these search terms to the real-time database of job postings developed by Indeed, which gave us an unadjusted count of job postings for core App Economy jobs.

However, that's only the beginning. Job postings for an occupation are only a fraction of the number of people employed in that occupation, since most positions are not empty. We developed an estimate for the ratio between the number of job postings for ICT jobs and overall ICT employment. This ratio is applied to the number of App Economy job postings to generate a provisional estimate of core App Economy employment. Crucially, we use a validation procedure to ensure we are actually counting job postings that correspond to core App Economy jobs. We use a conservative estimate of the indirect and spillover effects.[12]

RESULTS

As of March 2017, we estimate that the Australian App Economy now includes 113,000 jobs. Companies employing workers with App Economy skills include large and small app developers; software and media companies; financial and retail companies; Australian and non-Australian tech companies; nonprofits and government agencies; large corporations that develop and maintain apps; and accounting and IT consulting firms.

> As of March 2017, we estimate that the Australian App Economy now includes 113,000 jobs.

FIGURE 1: Australia's App Economy

THOUSANDS OF JOBS (MARCH 2017)	APP INTENSITY
113	0.9%

App Economy Jobs by Australian State

We also calculate App Intensity. App Intensity is the number of App Economy jobs in a country as a percentage of total jobs in that country. The higher the App Intensity, the larger the share of App Economy jobs in that country.

Australia has an App Intensity of 0.9 percent. By comparison, Europe has an App Intensity of 0.8 percent, while the U.S. App Intensity is 1.1 percent.

As noted above, one of our goals is to develop a measure of App Economy jobs by country, in order to assess the relationship between government policies and innovation-driven job growth. Figure 2 below provides estimates of App Economy employment by Australian state and territory. New South Wales ranks first, followed by Victoria and Queensland.

> Australia has an App Intensity of 0.9 percent. By comparison, Europe has an App Intensity of 0.8 percent, while the U.S. App Intensity is 1.1 percent.

FIGURE 2: App Economy Jobs by State and Territory (March 2017)

	APP ECONOMY JOBS, THOUSANDS
New South Wales	56.1
Victoria	29.0
Queensland	14.5
Western Australia	4.4
ACT	5.2
South Australia	1.6
Tasmania	1.3
Northern Territory	0.4

Data: Progressive Policy Institute, Indeed, ILO

Figure 3 shows the "App Intensity" of each state. It's worth noting that the European country with the highest App Intensity is Finland, at 2.2 percent.

FIGURE 3: App Intensity by State and Territory

	APP INTENSITY, MARCH 2017
New South Wales	1.5%
Victoria	0.9%
Queensland	0.6%
Western Australia	0.3%
ACT	2.4%
South Australia	0.2%
Tasmania	0.5%
Northern Territory	0.3%

Data: Progressive Policy Institute, Indeed, Australian Bureau of Statistics

Mobile Operating Systems

Many App Economy job postings list a mobile operating system or multiple mobile operating systems with which the job candidate is expected to be familiar. This allows us to assess the distribution of mobile operating systems in the Australian App Economy.

Figure 4 shows Australian App Economy jobs by operating system. As of March 2017, we estimate that 86 percent of App Economy workers in Australia (96,000 jobs) belong to the iOS ecosystem. The Android ecosystems accounts for 77 percent of App Economy workers in Australia, or 87,000 jobs.

FIGURE 4: Australian App Economy Jobs by Operating System

	APP ECONOMY JOBS (THOUSANDS)	SHARE OF ALL APP ECONOMY JOBS
iOS Ecosystem	96	86%
Android Ecosystem	87	77%

Data: Progressive Policy Institute, Indeed

The numbers sum to more than 100 percent because some jobs specify more than one operating system—say, both iOS and/or Android skills. From a policy perspective, the iOS ecosystem is likely to have a larger impact on entrepreneurship and the economy in Australia. That's because iPhone owners in Australia typically have higher incomes, and iOS apps tend to generate higher revenues for developers.

ppi

Examples

FIGURE 5: Types of App Economy Jobs

1. Large, medium, and small app developers, who may be creating apps for themselves or for clients.

2. Media and software companies that engage in app development for consumer use under their own name.

3. Finance and retail companies that use apps to reach customers.

4. Other small and large non-tech companies that are developing and using apps for internal and customer purposes.

5. Nonprofits and government agencies, including the military, which hire app developers to perform their functions.

6. Large companies such as Amazon that develop and maintain mobile app ecosystems/platforms.

7. Accounting and IT consulting firms, who provide app development as part of a larger suite of services.

> A surprisingly broad range of enterprises are searching for workers across the country who have the ability to design, develop, maintain or support mobile applications.

The Australian App Economy is remarkably diverse, both in industry and geography. A surprisingly broad range of enterprises are searching for workers across the country who have the ability to design, develop, maintain or support mobile applications. Based on our analysis of want ads, there are seven types of Australian enterprises that hire App Economy workers:

1. Large, medium, and small app developers, who may be creating apps for themselves or for clients. These firms constitute the leading edge of the App Economy. As of May 2017, global digital products company Tigerspike was hiring a Software Engineer with iOS or Android experience in Melbourne to build apps for clients. Once again, Chicago-based software company ThoughtWorks was hiring a Senior Software Developer with hands-on mobile development and delivery experience in Brisbane. In Perth, technology and business consulting firm Oakton was hiring a Mobile Applications Developer.

2. Media and software companies that engage in app development for consumer use under their own name. As of May 2017, design platform Canva was hiring an iOS Engineer in Sydney to work on its iOS application. Esri was hiring a Software Developer with recommended experience in iOS, Android or Windows Phone to help develop its cross-platform mapping and GIS solutions that run on mobile devices. Mobile advertising platform Leadbolt was hiring a Junior Support Officer with Android or iOS app developer knowledge in Bondi Junction. And once more, Electronic Arts was hiring a Game Designer in its Firemonkeys Studio in Melbourne to design mobile free-to-play games.

ppi

3. Finance and retail companies that use apps to reach customers. Finance and retail companies are hiring App Economy workers, as they look to expand the ways they interface with customers. For example, as of June 2017, Australia's largest online retailer Kogan.com was hiring Android and iOS Developers in Melbourne. The Bank of Queensland was hiring Senior iOS and Android Software Engineers to design and build its mobile applications.

4. Other small and large non-tech companies that are developing and using apps for internal and customer purposes. Across every industry, businesses are recognizing that apps are essential tools for increasing productivity, providing customer service and expanding their brand. As of May 2017, Australia's leading online automotive classifieds business Carsales was hiring an iOS Developer in Melbourne. hipages, a mid-sized home improvement startup, was hiring an Android Software Engineer in Sydney to develop core features of their Android application. In Adelaide, Energy Exemplar, an energy software firm, was hiring a Software Developer with Android or iOS skills. In Launceston, asset management firm ARMS Reliability was hiring a Software Developer with iOS or Android experience to design and develop software applications.

5. Nonprofits and government agencies, including the military, which hire app developers directly or indirectly. The Australia national government has a long list of apps that can be accessed directly at http://australia.gov.au/services/apps-services. As of May 2017, a federal government agency was looking for Mobile Application Developers "to develop a number of critical mobile applications" in Canberra. St. John's Community Care was hiring a Junior Systems Analyst in Cairns to monitor software applications and phone technologies and develop, configure and maintain Android systems.

6. Large companies such as Amazon that develop and maintain mobile app ecosystems/platforms. While these companies are largely based in the United States, they do contribute to job growth in Australia. For example, as of May 2017, Amazon was hiring a Developer with experience scripting or developing in iOS in Sydney.

7. Accounting and IT consulting firms, which provide app development as part of a larger suite of services. This separate but important category of App Economy employers includes large operations such as Deloitte which, as of May 2017, was hiring Mobile Developers in Melbourne to design and develop user interfaces for mobile applications.

ppi

COMPARISON WITH THE PREVIOUS REPORT

We continually strive to improve our cutting-edge methodology. In July 2014 PPI released a report entitled "Jobs in the Australian App Economy." That report, using an earlier version of our methodology, found a somewhat larger number of App Economy jobs than the current report. However, that apparent difference is completely due to our shift to a globally consistent methodology in 2015. In fact, our best estimate is that the number of App Economy jobs in Australia has increased by at least 11 percent since 2014. The same is true for App Economy jobs by state.

> In fact, our best estimate is that the number of App Economy jobs in Australia has increased by at least 11 percent since 2014.

CONCLUSION

The App Economy has unleashed an important source of employment and economic growth in Australia, especially in the wake of the Great Recession. When the Recession began in 2007, the first iPhone had just been sold, enabling the explosion of the App Economy. And, as this sector continues to expand around the globe, Australia could become an exporter of apps and app-related services.

Remember that any app is exportable, in the sense that it can be downloaded from an app store by anybody around the world, no matter how far the distance. That means the Australian App Economy can become a basis for continued growth. In addition, apps can improve the efficiency and attractiveness of the Australian economy.

Policymakers should be mindful of the tradeoff between growth and regulation. In 2012, Australia passed the Privacy Amendment Act, which established a new system of privacy principles, applicable to both government and non-governmental entities and gave the government enhanced enforcement powers.[13] On the other hand, in early 2017, a decision by the Australian Federal Court narrowed the definition of private information for the purposes of privacy.[14]

> Remember that any app is exportable, in the sense that it can be downloaded from an app store by anybody around the world, no matter how far the distance. That means the Australian App Economy can become a basis for continued growth.

Of course, a country's laws are a reflection of its cultural values and history. However, a general principle is that the tighter the regulations, the more obstacles in the path of growth for the innovative App Economy.

It's also important to note that the App Economy is closely related to the Internet of Everything, which may be the next stage of the Information Revolution.[13] Just like the Internet transforms "digital" industries such as entertainment and financial services, the Internet of Everything does the same for physical industries such as mining, healthcare, and public services, using distributed sensors and wireless connections. Policymakers should be aware that a country such as Australia, with a large natural resource sector, may derive great productivity gains from the Internet of Everything.

> Policymakers should be aware that a country such as Australia, with a large natural resource sector, may derive great productivity gains from the Internet of Everything.

Appendix

METHODOLOGY

The methodology consisted of seven steps.

1. Identification of App Economy job postings

Using summary statistics generated by searches on au. indeed.com, we identified job postings ads for App Economy jobs containing one of the following key words: iOS, Android, Blackberry, Windows Phone, Windows Mobile and app.

2. Validation

Invariably, some job postings identified in Step 1 will not fit the criteria of an App Economy worker (e.g. a job posting for a truck driver using an app). We therefore validated the sample by manually examining a sample of the job postings from Step 1 to eliminate those that do not fit our criteria of an App Economy worker.

This allows us to estimate a validation ratio that we applied to the results of Step 1.

3. Identification of IT job postings in Australia, and estimation of the ratio of job postings to employment for overall ICT occupations

We constructed a keyword list to identify job postings for ICT professional occupations in Australia. This included a core list of English words and phrases commonly found in job postings for IT occupations (such as "java" and "database" and "app").

We then validated the outcome using the same methodology as Step 2, manually examining a sample of job postings to assess which actually correspond to ICT occupations. Then the resulting number was used to estimate the ratio of job postings to employment for overall ICT occupations, using data from the Australian Bureau of Statistics.

4. Estimation of App Economy core jobs for Australia

We multiplied the ratio generated in Step 3 and the validated number of App Economy job postings generated in Step 2. The result gave us the estimate of core App Economy jobs for Australia in March 2017.

5. Estimation of total App Economy employment for Australia

Using the same multipliers as in our previous work, we estimated the total number of App Economy jobs in Australia. We assumed that each core App Economy job is supported by one job-equivalent at the same company (e.g. managers, human resources, accounting). Then we assume that each company job generates one job in the rest of the economy. This is a very conservative assumption for spillovers.

6. Estimation of the total employment in the iOS and Android ecosystems in Australia.

Out of the set of job postings containing the terms "iOS" or "Android", we identified the share that contain terms belonging to the iOS ecosystem (Apple, iPad, iPhone, iOS) and the share belonging to the Android ecosystem (Android, Google). Then those shares were applied to all App Economy employment.

7. Estimation of App Economy employment by states

The Indeed database enabled us to identify App Economy job postings by state. We therefore could rank states by App Economy employment.

References

1   "Ericsson Mobility Report: Interim Update," February 2017,
    https://www.ericsson.com/assets/local/mobility-report/documents/2017/emr-interim-february-2017.pdf.

2   Ibid.

3   The term "App Economy" was being used as early as 2009, in a BusinessWeek cover story "Inside the App Economy," (October 22, 2009).
    http://www.bloomberg.com/news/articles/2009-10-22/inside-the-app-economy.

4   Michael Mandel, "Where the Jobs Are: The App Economy," (February 2012).

5   Michael Mandel, "Jobs in the Australian App Economy," (July 2014).

6   See "Economic Revival and The Unpredictability of Technological Innovation," July 6, 2016.
    http://www.progressivepolicy.org/issues/economy/local-economic-revival-unpredictability-technological-innovation/

7   See Michael Mandel, "Data, Trade, and Growth," Progressive Policy Institute, April 2014.
    http://www.progressivepolicy.org/slider/data-trade-and-growth/

8   See, for example, "The Onrushing Wave: Previous technological innovation has always delivered more long-run employment, not less.
    But things can change," The Economist, January 28, 2014. http://www.economist.com/news/briefing/21594264-previous-
    technological-innovation-has-always-delivered-more-long-run-employment-not-less.

9   "Silicon Valley Is Not a Job Creator," Fortune, December 4, 2015. http://fortune.com/2015/12/04/silicon-valley-is-not-a-job-creator/.

10 "Wireless Jobs Evaporate Even As Industry Expands," Wall Street Journal, July 17, 2011. See my analysis at
    https://innovationandgrowth.wordpress.com/2011/07/24/misinterpreting-data-how-the-wsj-got-the-wireless-jobs-story-wrong/.

11 Steve Lohr, "Google Flu Trends: The Limits of Big Data," New York Times, March 28, 2014.
    http://bits.blogs.nytimes. com/2014/03/28/google-flu-trends-the-limits-of-big-data/

12 We assume that each core App Economy job is associated with two additional jobs (combined indirect and spillover). This assumption
    is low compared to the typical job multiplier found in the literature, which can go as high as 5 or even higher. See, for example, "Job
    Multipliers: Silicon Valley vs. The Motor City."

13 "Privacy law in Australia: an overview," March 2014.
    http://www.lexology.com/library/detail.aspx?g=f508c927-860b-43a4-832a-aabea4169037

14 "Landmark Australian ruling on what counts as 'personal information'," ITNews, January 19, 2017.
    https://www.itnews.com.au/news/landmark-australian-ruling-on-what-counts-as-personal-information-448049

15 Michael Mandel and Bret Swanson, The Coming Productivity Boom, March 2017.
    http://www.techceocouncil.org/clientuploads/reports/TCC%20Productivity%20Boom%20FINAL.pdf

ppi

The Progressive Policy Institute is a catalyst for policy innovation and political reform based in Washington, D.C. Its mission is to create radically pragmatic ideas for moving America beyond ideological and partisan deadlock.

Founded in 1989, PPI started as the intellectual home of the New Democrats and earned a reputation as President Bill Clinton's "idea mill." Many of its mold-breaking ideas have been translated into public policy and law and have influenced international efforts to modernize progressive politics.

Today, PPI is developing fresh proposals for stimulating U.S. economic innovation and growth; equipping all Americans with the skills and assets that social mobility in the knowledge economy requires; modernizing an overly bureaucratic and centralized public sector; and defending liberal democracy in a dangerous world.