CHILE 2040

An Analysis of the Population, Economic and Socioeconomic Dynamics of Chile through 2040

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INTS 4601: Development Forecasting with IFs

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ABSTRACT

In January 2010, Chile was invited to become the 31st member of the OECD (Organization for Economic Co-operation and Development). As the first South American country invited to the prestigious group of developed nations, it demonstrated a global recognition of 20 years of successful economic policies in Chile (OECD Online, 2010). As a member, Chile will be committed to the OECD mission of improved economic policy making and providing the highest health, education, and employment opportunities to its citizens (OECD Online, 2010).

Despite the acknowledged progress made in the past two decades, there remains a flagrant disparity in wealth, income and opportunities within the Chilean economy (WHO Online, 2010). These disparities exist due to key social and economic prospects that Chile should pursue in order to continue its development trajectory, as well as meet OECD expectations. In circular fashion, these interventions will positively impact inequality throughout the country and ideally allow Chile to remain on a path of sustained economic growth.

These opportunities are: improve labor participation by creating more and better jobs and encouraging additional female contribution to the labor force, increase public spending on areas such as education and targeted poverty programs, and improve economic productivity through human capital advancement (education) and knowledge capital growth (innovation and technology). Utilizing forecasting mechanisms, it was confirmed that if followed, policy changes involving these variables should certainly influence economic growth and inequality in Chile.

INTRODUCTION

The celebration of Chile's induction to the OECD was short-lived, as Chile was battered by a 6.9 magnitude earthquake south of Santiago, creating $10 – $30 million USD worth of damage to buildings and infrastructure (Wikipedia/Chile, 2010) on February 27, 2010. It served as a stark reminder of uncontrollable, cataclysmic impacts that can affect a rapidly growing economy. Chile's government is still working to fund reconstruction efforts, but has not been devastated by the quake, once again demonstrating the country's resiliency.

Utilizing the International Futures (IFs) forecasting software,[1] this paper will address the current population and economic status of Chile and the main political and socioeconomic events that led to where it is at today. It will also review forecasts that mimic economic policy making to determine what interventions can lead Chile toward rivaling its OECD peers. The focus is on the population, economic and socioeconomic dynamics of Chile and recommendations for specific approaches to improve economic development by 2040, thereby truly positioning Chile as a 'developed' nation. Metrics are established based on OECD country averages in order to ensure Chile is on a trajectory toward the next 'rung on the ladder of development.'

[1] Figures (graphs) included in this report are pulled from IFs software, version 6.36, created by Dr. Barry Hughes, University of Denver, unless otherwise noted.

WHERE ARE WE NOW?

POPULATION

Officially the 'Republic of Chile,' this South American coastal country is currently home to 16.6 million people. Chile experienced a strong population growth over the past 25 years, increasing 37.0% from 12.1 million in 1985 (OECD, 2009, p. 15). At present, the growth rate has slowed to 0.89%, with a birth rate of 14.6 and a death rate of 5.8 (CIA World Factbook Online, 2010).

These metrics validate that Chile has completed the process of 'demographic transition,' where fertility rates decline to replacement level (Todaro, 2009, p.283). In fact, Chile is trending below the replacement fertility rate of 2.1 at 1.9 children born per woman (CIA World Factbook Online, 2010). The country should see a demographic dividend, which usually occurs late in the demographic transition, since the largest age cohorts are within the working-age population and the immediate level below (10 – 14 years), as seen in Figure 1.1 below.

Figure 1.1

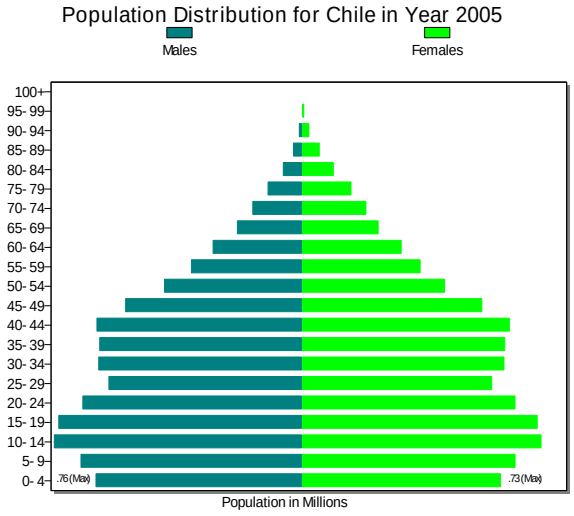
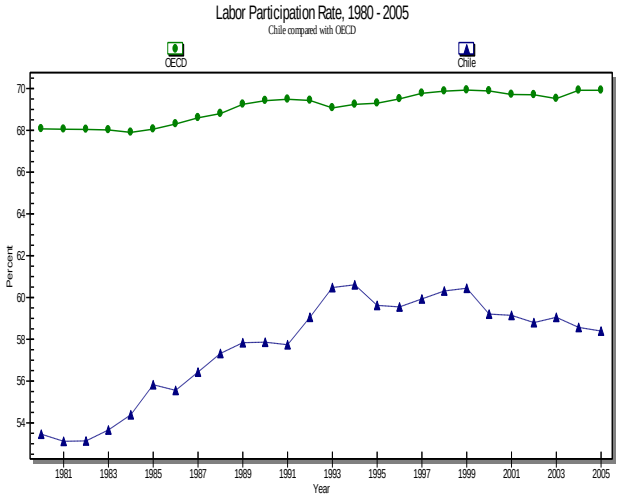


Figure 1.2



Given this burgeoning growth in the working-age population, Chile will need to accommodate the new volume of workers immediately as the 10 – 14 cohort is now of working age. In fact, Chile should have been working furiously to create new jobs given the population forecasts for 2010 and beyond. Based on current labor participation rates, Chile is not effectively utilizing the labor supply of working aged individuals (15 – 64) as compared to other OECD countries (OECD, 2009, p. 15), and as displayed in Figure 1.2. It is forecasted that Chile's working population will increase by 1.6 million people by 2020, and then remain relatively consistent up through 2040 (IFs, 2010).

Thus job creation is critical, given that unemployment is also an issue in Chile as illustrated in Figure 1.3. Furthermore, educational considerations will be a factor in economic decision making as the younger working-aged cohorts will also need more access to education in order for Chile to compete globally. Chile's expenditure on education is lagging behind the OECD, as shown in Figure 1.4.

Figure 1.3

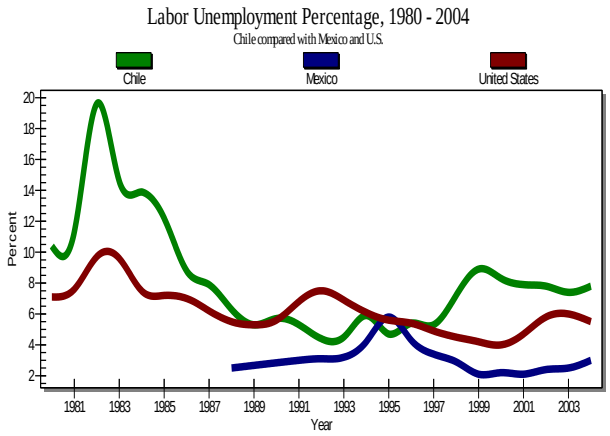
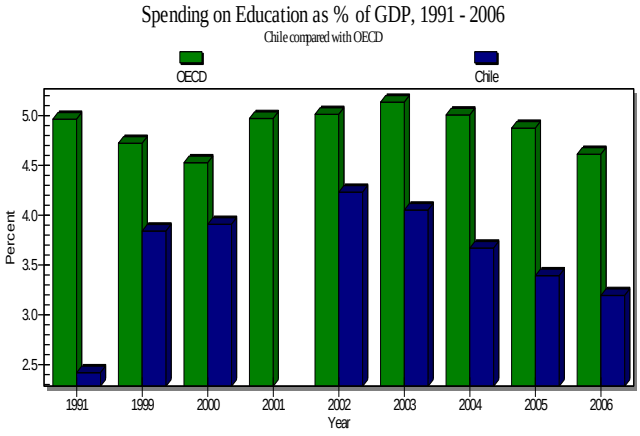


Figure 1.4



The declining birth rate has also contributed to a low dependency burden. Thirty-three percent of the population in 2005 is within the dependent population ages (0-14 and 65+), indicating less economic burden on the growing working-aged cohort. Indeed looking historically, the dependency burden in Chile has slowly approached and surpassed developed country rates, as exhibited in Figure 1.5.

Figure 1.5

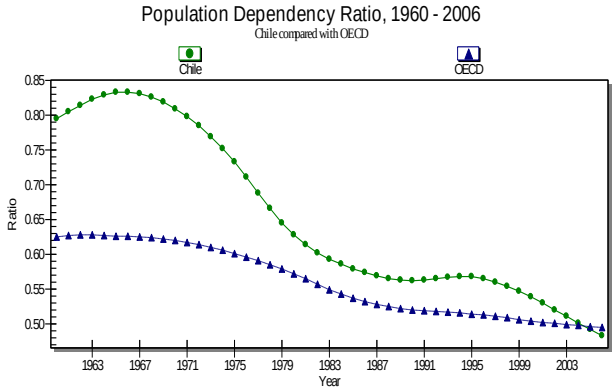
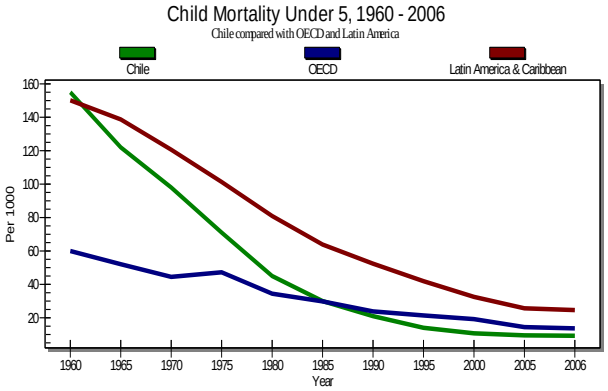


Figure 1.6



A positive metric that normally contributes negatively to dependency burden, Chile's infant mortality metrics rivaled and surpassed the OECD by the late 1980s. According to economist Amartya Sen, active public and state intervention and not free market reform (Wikipedia/Chile, 2010) allowed Chile to achieve this dramatic decrease in infant mortality rate, significantly outshining its Latin American peers, as shown in Figure 1.6.

Finally, though immigration in Chile is positive, net migration is small compared to the total population (.04% - .08%) and thus so far a negligible factor in population forecasts. This may change if Chile attracts a significant number of workers from neighboring countries as it continues on an economic growth path.

ECONOMY

Chile has demonstrated remarkable economic progress over the past 25 years, boasting a 6% increase per year in Gross Domestic Product (GDP) (OECD, 2009, p. 15). This fantastic, sustained growth is part of the reason Chile was admitted to the OECD in 2010. Often coined the 'rich country club,' Chile will reap many benefits from its relationships as part of the OECD, on the other hand, it will also be tied to market guidelines instituted by the OECD, somewhat limiting the country's independent economic strategy. Nonetheless, Chile will profit from lower cost of borrowing and increased foreign investment, among other positive attributes of membership (Business Chile Online, 2010).

However, the economic evolution in Chile wasn't easy and has been hard sought since the 1970s. President Salvador Allende's socialist policies, dominated by nationalization and state intervention in Chile's main industries resulted in skyrocketing inflation and an economic depression in the early 1970s (Wikipedia/Chile, 2010). Political unrest ensued as transnational corporations balked at widespread nationalization and the Richard Nixon administration covertly attempted to destabilize the Allende government while overtly putting economic pressures on Chile. In September of 1973, a military coup led by General Augusto Pinochet resulted in Allende's demise and the immediate seize of the Chilean government by military forces.

Pinochet ushered in free-market reform (ironically, at the same time he introduced massive oppressive human rights violations). Known as the 'Miracle of Chile' and advised by economist Milton Friedman, Pinochet attempted to combat a 505% inflation rate in 1974 (Oppenheim, 1999). The approach included increasing prices and cutting government spending. Although the desired effect was somewhat achieved, a 130% reduction in inflation by 1975, Pinochet's 'Shock Treatment' resulted in a 16.6% reduction in GDP and skyrocketing unemployment (Oppenheim, 1999). The program was ended in 1976.

Pinochet continued with his economic reform by privatizing enterprises under state control, reducing tariffs to create an open market, deregulating financial markets and reforming social security. Though the regime was criticized politically for the human rights infringements, Pinochet did gain economic legitimacy for Chile within the international financial arena (Oppenheim, 1999).

Yet economic crisis hit in the early 1980s, prompting opposition toward the military leader as bankruptcies, interest rates, unemployment and foreign debt rose. In 1988, 16 years of military rule was ended with the election of Patricio Alywin. Alywin's election was critical in its political success in returning Chile to a democracy. Alywin retained most of the previous economic policies and throughout the 1990s, Chile experienced unrivaled economic success in Latin America: decreasing inflation, unemployment, and external debt and increasing exports, foreign capital investment and fiscal surplus. Figure 1.7 demonstrates Chile's GDP growth superiority from the mid 1980s onward. Furthermore, Chile was the only Latin American country to see significant reduction in absolute poverty in the 1990s (Angell, Lowden, & Thorp, 2001, p. 222) as seen in Figure 1.8. Poverty decreased 38.6% from 1990 – 2006, equating to 2.8 million people moving out of poverty (OECD, 2009, p. 53).

Figure 1.7

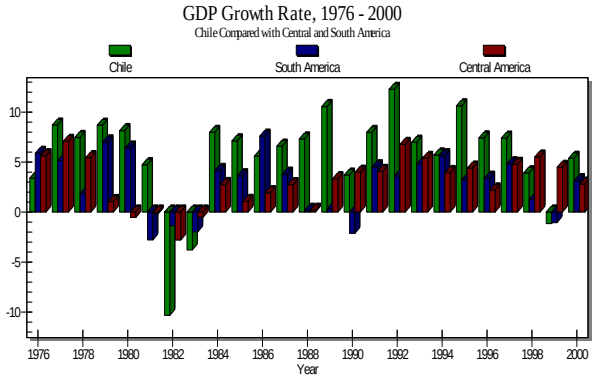
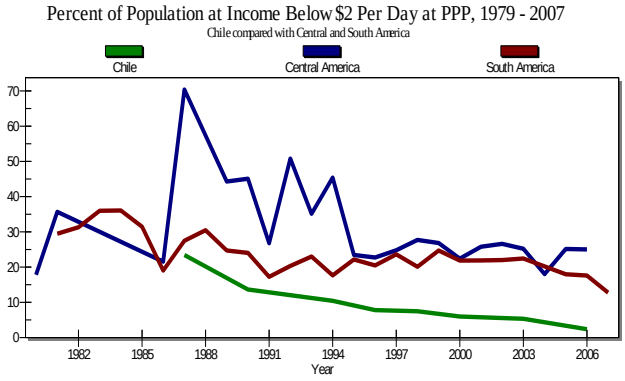


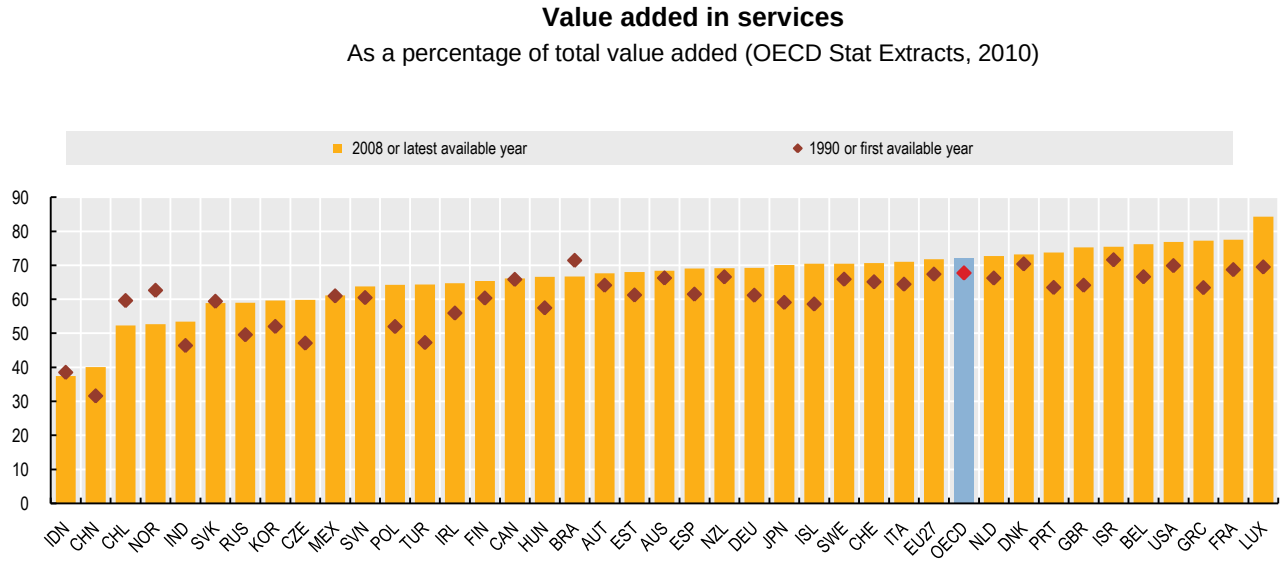
Figure 1.8



Today the Chilean economy is still heavily neo-liberal and market oriented. Exports account for almost 40% of the total GDP and of those exports, copper comprises nearly 50% (OECD, 2010, p. 7). In fact, copper alone provides one-third of the government's revenue (CIA World Factbook Online, 2010). The sectoral composition of the GDP is predominantly Services (65.9%), followed by Mining (17.6%) and Manufacturing (12.8%). Agriculture makes up a small portion of GDP at 3.7% (OECD, 2010, p. 7).

Since 1996, the agricultural value added has declined, and value added from services has shifted to industrial value added (including mining and manufacturing). Compared with OECD averages, Chile's proportion of value added by services is lower than most other member countries (52% compared with 72% OECD average) as seen in Figure 1.9 (OECD Stat Extracts, 2010). Despite its economic success in mining and copious copper resources, the lack of diversification in government revenue and GDP composition may be a cause for concern in continuing to grow the Chilean economy.

Figure 1.9



Due to its reliance on copper exports, Chile is highly exposed to variable demand and price sensitivities in the global market. This was exemplified by the Chilean economy's hit from the international trade collapse and global economic crisis in 2008. However, the country follows a counter-cyclical fiscal policy and accumulates surpluses in the form of sovereign wealth funds (called the *Economic and Social Stabilization Fund*) during high copper price periods, allowing deficit spending during low copper price periods and slow economic growth. Utilizing $4 billion USD of the sovereign wealth funds in 2008, Chile's macroeconomic management led it out of the recession and into its current situation, estimating 5.5% growth in 2010 (Bloomberg News, 2010).

Chile does well at managing its sovereign wealth funds, choosing to use them as a domestic economic tool to smooth out government spending with surpluses during weak trade periods, and not a political tool (Knowledge at Wharton Online, 2010). The country also created a wealth fund for pensions in 2008. The Chilean government manages both of these funds by following established international practices and publishes regular reports on the status of the funds, thus demonstrating transparency as well (Lipsky, 2008).

WHERE ARE WE GOING AND WHERE DO WE WANT TO GO?

Being the first South American country and second Latin American country (after Mexico) offered OECD membership, it is appropriate for Chile to compare itself rigorously to other OECD countries in order to continue its development trajectory. Regardless, the OECD will closely monitor economic policies within Chile to ensure its newfound membership is warranted.

Despite impressive economic growth and reductions in poverty in Chile, with a current Gini coefficient of 0.53, income inequality is the highest of all OECD countries, including Mexico and Turkey, who post the second and third highest income inequality (OECD, 2009, p. 53). In fact, Chilean income inequality as measured by the Gini coefficient has not changed markedly in 20 years and income per capita at Purchasing Power Parity (PPP) is only 44% of OECD countries (OECD, 2010, p. 9). Forecasted GDP per capita continues to fall behind per Figure 1.10.

As well, Figure 1.11 displays the forecast for Chilean inequality, which also looks dire. Compared with the world average, Latin America and OECD, Chile has the worst income inequality among them all – not exactly a 'bragging right.'

Figure 1.10

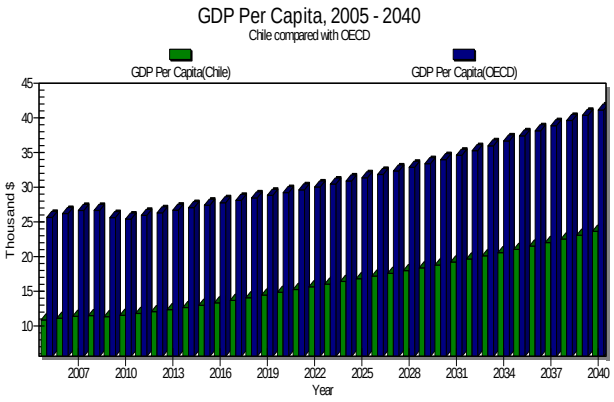
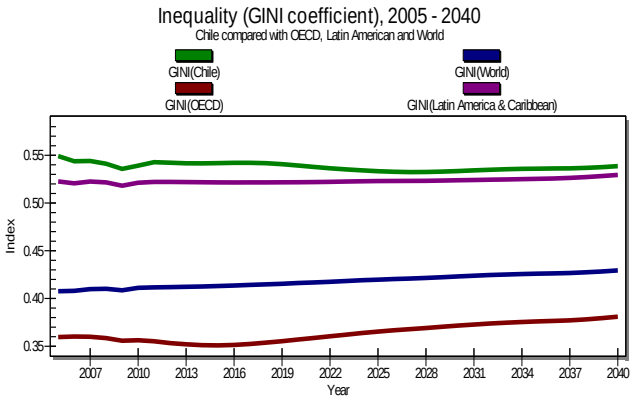


Figure 1.11



Therefore, the primary focus for Chilean economic improvement should be centered on decreasing income distribution disparities. Looking at forecasted data through 2040, it is clear that though per capita GDP does improve (from 44.0% to 57.5% of OECD aggregation) the Gini measure is relatively stagnant. Opportunities for continued development in Chile to get 'where we want to be' should be concentrated in three areas: human capital and labor participation, increased and targeted public spending efforts and advanced knowledge capital (improving technology and innovation). Given the interrelatedness of economic and social attributes, interventions in these areas should ultimately result in continuous economic growth and an improvement in income inequality in Chile.

HUMAN CAPITAL AND LABOR PARTICIPATION

Based on Development Profile Data from IFs and compared to the OECD, human capital deficiencies in Chile are apparent in years of education, education spending and health care spending, as shown in Table 1.

Table 1 (IFs, 2010)

Human Capital 2005	**CHILE**	**OECD**
Years of Education	8.25	9.74
Education Expenditure	3.39	4.86
Health Expenditure	2.83	6.71
Knowledge Capital 2005	**CHILE**	**OECD**
R&D Expenditures	0.12	0.24

In order to meet the employment demand created by the population stratification mentioned earlier, it is critical that the Chilean labor market expand. Not only new jobs, but *better* jobs – with two-thirds employment in the service sector, modest wages abound (OECD, 2009, pp. 58-60). Increases in foreign direct investment (FDI) should create additional jobs; however, the mining industry is the largest recipient of FDI in Chile (OECD, 2010, p. 91). This is partially due to lack of skilled labor, therefore human capital (education) progress would need to be made to further incite FDI in other industries as well as create opportunities for higher waged employment in Chile.

The good news is that enrollment in primary and lower-secondary education is nearly universal, and upper secondary education enrollment is progressing toward OECD averages. However, there is room for improvement in tertiary education (OECD, 2009, pp. 11 - 18) as seen in Figure 1.12. As may be expected, female participation in the labor force is highly correlated with education attainment. It is imperative that female participation in the labor market increase in order to improve income inequality and economic productivity. Currently at 39%, female labor participation is well below the male participation rate of 72%, and also fails to meet the OECD standard rate of 57% (OECD, 2009, p. 15).

Forecasting the female share of the labor force through 2040, without specific interventions Chile will still fall short of OECD standards at 43%, as exhibited in Figure 1.13. However, based on forecasts, female enrollment in tertiary education will equal male enrollment by 2022 (IFs, 2010). Finally, it's important to note that household income is the major determinant in gauging income equality. Since the largest component of household income is

wages, and wage distribution in Chile has not changed much from 1990 – 2006, labor income must be impacted to ameliorate inequality (OECD, 2009, p. 58).

Figure 1.12

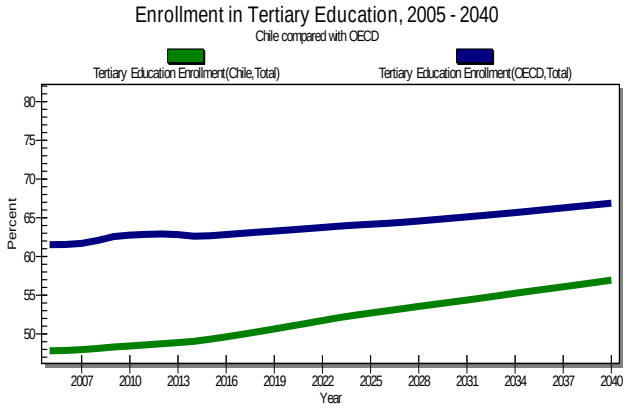
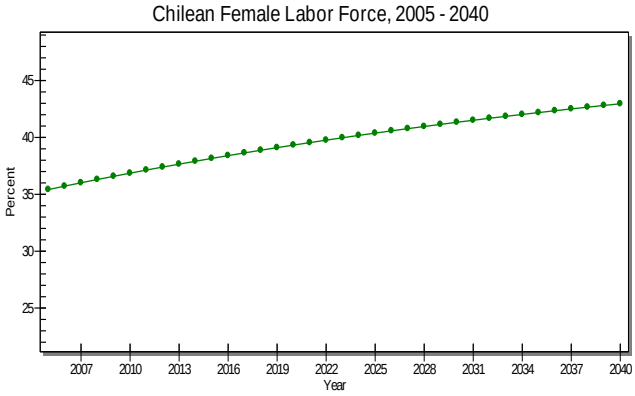


Figure 1.13



KNOWLEDGE CAPITAL

Continuing with the theme of Chile's further evolution toward a 'developed' economy, innovation is key to move the country beyond its past economic successes. Entreprenuership and diversification into higher productivity markets are deficient in Chile. Most Research and Development (R&D) has been relegated to universities and public institutions, therefore private sector needs to be incented to focus on innovation, both technology and non-technology related. As well, partnerships should be formed between public and private sector to achieve economies of scale in Chilean knowledge capital (OECD Online, 2010). If no proactive measures are taken, R&D investment continues to lag through 2040, demonstrated in Figure 1.14. Chile only spends about 30% what other OECD countries spend on R&D (OECD Online, 2010) thus will need to increase that spending.

Another negative economic impact of minimal levels of innovation and technology is low productivity. Reviewing the forecast for productivity in Chile, it is concerning that human capital and knowledge capital show modest gains (if any) and make-up a small portion of the total multifactor productivity, as seen in Figure 1.15. The figures below validate a need for investment in knowledge capital interventions, as productivity is a key impact on economic growth.

Figure 1.14

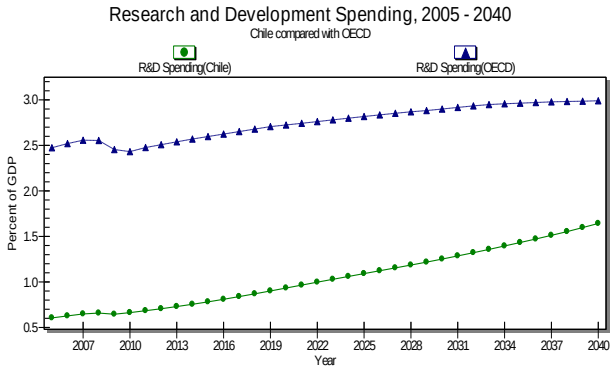
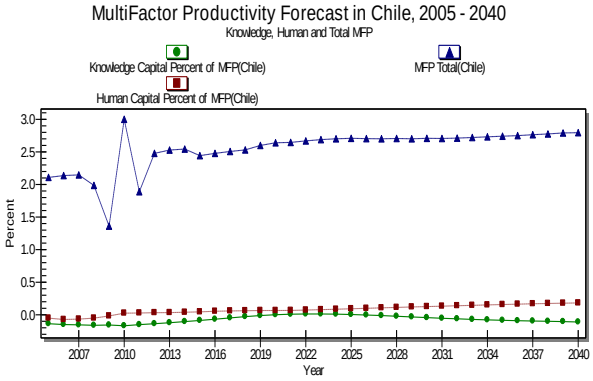


Figure 1.15



PUBLIC SPENDING

Improved labor participation and FDI will also add tax dollars to the public spending system and allow for more government reallocation, another impact to income inequality in Chile. Public spending will need to increase to facilitate income redistribution, which may also need to be bolstered by additional tax policies. As Chile becomes more developed, a larger share of public spending will need to be dedicated to social programs in order to guarantee more equal living standards and meet the rising demands of Chilean society. Compared to OECD countries, the current portion of public spending and social programs is too small. Public spending in relation to GDP is about half the OECD average (OECD, 2010, p. 12)

One aspect of ex-President Alwin's approach that differed from Pinochet was to increase social spending by more than $1.5 billion USD (Hudson, 1994) to impact education, health and pensions and ideally have a positive effect on distribution of income. Unfortunately it did not make much headway in impacting income disparities. In recognition of the failure of 'trickle down' theory[2] given Chile's GDP per capita growth, 'Chile Soldario,' was created in 2002. A program aimed at eliminating extreme poverty through a combination of aid and skill development was incepted under President Ricardo Lagos (Palma, 2005). However, the program has not been remarkably effective to-date and thus additional investment is warranted (OECD, 2009, pp. 121 - 123).

President-elect Sebastian Pinera, holding office since March 2010, delivered his budget to Chilean congress in late September 2010. This budget included additional social spending allotted for health, education and housing ministries. This is a step in the right direction given the lackluster forecasts discussed above.

HOW WILL WE GET TO WHERE WE WANT TO GO?

The Chilean economy is not only in a good position for growth but is currently on the upswing. Rebounding from turbulent years due to the global economic crisis and the February earthquake, the Chilean Central Bank estimates Chile will average 5.0 – 5.5% growth in GDP in 2010 (Bloomberg News, 2010). In addition to macroeconomic

[2] Development economists were confident poverty would decline with economic growth. 'Kusnets Curve' hypothesized that as economies moved out of agriculture, inequality would decrease and there would be 'trickle down' effects, lifting the poor out of poverty (Haslam, Schafer, & Beaudet, 2009, p. 233). Unfortunately the income inequality gaps that existed after significant economic growth in developing countries exhibit the inadequacy of this theory.

policy, contributors to economic growth are increased consumer spending as well as improved industrial output (Bloomberg News, 2010). As well, money is flowing in from government bond sales, resulting in the best economic growth Chile has seen in 5 years (Bloomberg Businessweek, 2010).

As of early March, over one million children could not attend school due to earthquake destruction; yet within 45 days all students were back at school (Newsweek, 2010). This exemplifies Chile's quick and furtive rebuilding efforts that also apply to the economy. The government is focused on encouraging investment in the private sector, as well as entrepreneurship and innovation. Furthermore, President Pinera recently commented that his goal is for Chile to become the first Latin 'developed' country by ending poverty in Chile in the next decade (Financial Times, 2010). He also conceded that in order to accomplish this, a focus on education and labor is mandatory.

ECONOMY

With such a large percentage of its exports concentrated in copper mining, Chile will have to diversify its goods and services in order to continue its trajectory of economic growth. Chile has had success in exporting wood, wine and fresh fruit (The Berkeley Electronic Press, 2009) among other exports and has benefitted from opening its economy over the past few decades to international markets. Recognizing this need, Chile recently implemented an aggressive agricultural policy to improve agricultural exports, with the goal of becoming one of the world's top 10 food and agricultural exporters by 2015 (Echeverria, 2010).

As mentioned above, Chile's agricultural exports are only 3.7% of GDP. Compared to the two top agricultural exporting countries in the world, the U.S. and France, Chile's agricultural exports are significantly lower, as exhibited in Figure 1.16. A review of agricultural support policies by OECD in 2008 revealed Chile has lower support and protection of its agricultural industries as compared with other OECD countries (OECD Online, 2010). Low educational attainment was also cited as an impediment to continued agricultural growth, highlighting an additional human capital gap in Chile.

In addition, studies by the OECD have demonstrated the importance of agriculture in reducing poverty. Investments in agricultural research, development and education should result in an improvement in agricultural productivity (Cervantes - Godoy, 2010). Though Chile has made significant progress to-date in overall poverty reduction, a concentrated investment on agricultural growth could continue to positively impact income distribution. As seen in Figure 1.16, an increase in agricultural demand for crops and meat does impact Chilean exports by about 0.7 million metric tons by 2040, however, total exports would still fall significantly below France and the U.S.[3]

[3] Agdemm was increased for both crop and meat in Chile, interpolating from 1 to 1.2 from 2010 – 2015, and then a continuous multiplier of 1.2 from 2015 – 2040.

Figure 1.16

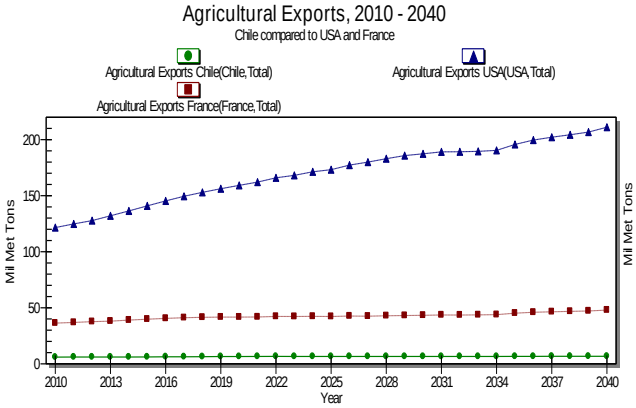
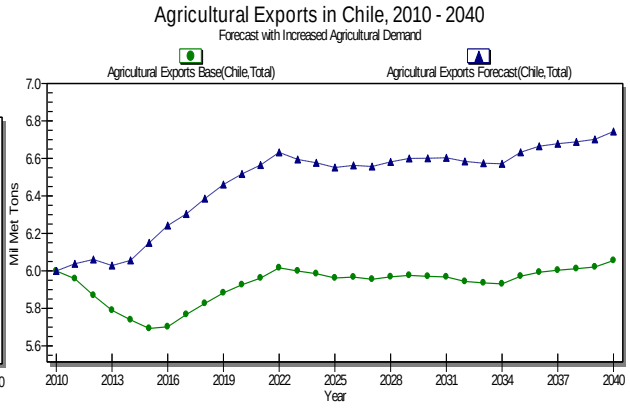


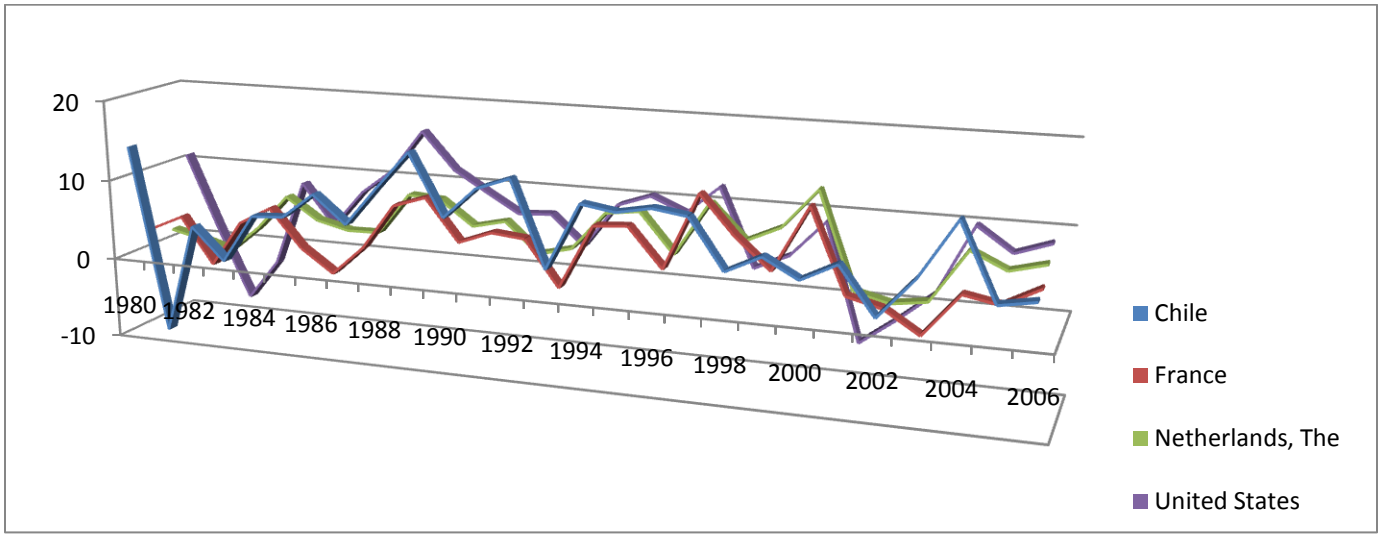
Figure 1.17



Yet, it should be noted that Chile has made significant progress in its export growth over the past three decades. As demonstrated in Figure 1.17, Chile only recently feel behind in annual percentage growth of exports of goods and services as compared with the major agricultural exporters: France, the Netherlands and the U.S. (The World Bank Data, 2010).

Figure 1.18

Annual Growth Percentage of Exports of Goods and Services, 1980 – 2006
Chile compared with U.S., France and The Netherlands (The World Bank Data, 2010)



There is also an opportunity for Foreign Direct Investment to help facilitate the diversification of Chilean economic growth and exports. Chile's receipt of incoming funds is the highest among South American countries given the stable environment and non-discriminatory policies (OECD, 2010, p. 91). Most of the FDI in Chile has been centered on the mining industry and thus there is a necessity to grow FDI in other industries. Specifically in relation to improving technology and innovation, the mining industry isn't going to directly impact this deficit. Targeted FDI in sectors other than mining will also contribute to the diversification and competitiveness of trade

and exports for Chile (OECD Online, 2010). Though the IFs model does not directly link FDI with productivity, studies have shown that FDI does have an impact on multifactor productivity (Fernandez, 2008) which has a significant impact on GDP in the model.

Utilizing the IFs model to forecast FDI increases from abroad improves Chile's FDI stock by 142 billion USD by 2040 as seen in Figure 1.19 below.[4] That is a significant amount of stock to be directed toward manufacturing, services and agricultural industries in order to expand the revenue options in Chile. A brute force increase in multifactor productivity does result in increased GDP for Chile, thus increased FDI is another economic option that Chile should proactively pursue. As mentioned earlier, now that Chile is part of the OECD there should be increased interest in FDI coming from abroad. The data in Figure 1.20 confirms the majority of FDI to-date has been focused predominantly on mining. As such, CORFO, a Chilean government organization that promotes economic growth, created a program named *InvestChile* in 2000. *InvestChile* uses subsidies to attract FDI in high technology-using sectors, though impact of the program on attracting actual FDI hasn't been studied (OECD, 2010, p. 91).

Figure 1.19

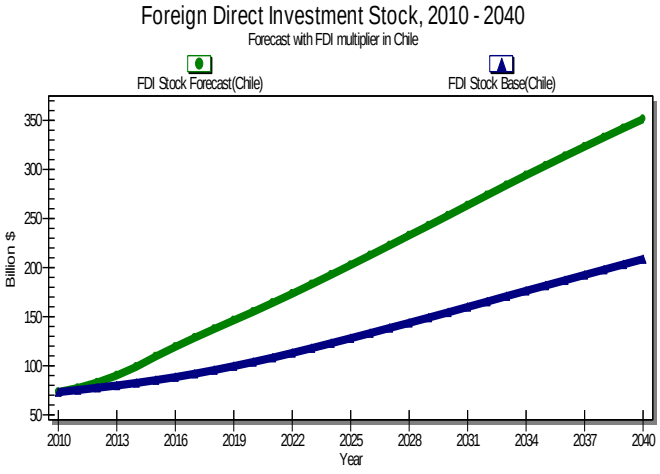
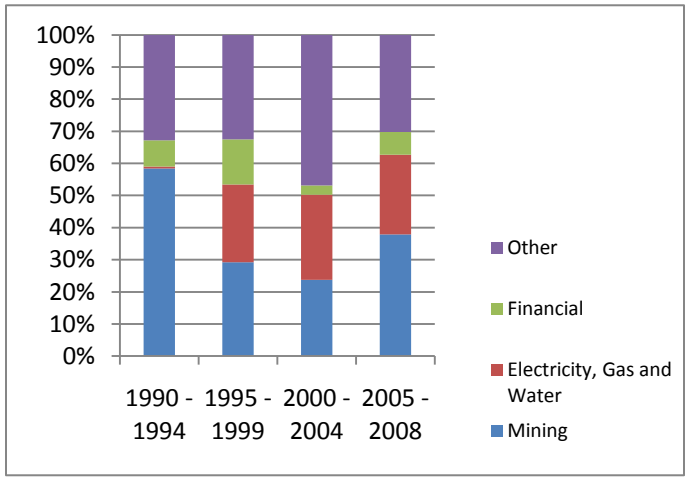


Figure 1.20

Foreign Direct Investment by Sector, 1994 – 2040
(OECD , 2010)



HUMAN CAPITAL AND LABOR PARTICIPATION

As mentioned earlier, Chile should see a demographic dividend due to the declining population dependency ratio from the increased working aged cohort. However, the magnitude of the demographic dividend is dependent upon the economy being able to provide an adequate job supply for the additional work force (Wikipedia, 2010). Seeming to be moving in the right direction, the Santiago Chamber of Commerce forecasts 330,000 new jobs created in 2010, many of them targeted toward women (Financial Times, 2010).

[4] Xfdistockm was increased to 1.2, interpolated from 2010 to 2015 and sustained at 1.5 through 2040.

Since it appears job creation momentum exists, labor productivity improvement must also be considered. Tertiary education strength is a strategic focus area that is closely related to labor productivity and human capital improvement. As mentioned earlier, though primary and secondary education enrollments have improved significantly in Chile, tertiary enrollment lags behind OECD averages. As of 2007, Chilean tertiary education attainment for ages 25 – 64 is only 13.2% of that total cohort, compared with 27.4% OECD average (OECD Stat Extracts, 2010).

This disparity is in part due to Chile's tertiary education policies. Chile's approach to education spending is a mix of public and private funding, where students and families make a significant contribution. This is an extremely divergent stance compared with other Latin American countries that impose minimal to no fees in tertiary education. In fact, Chile's public spending in education as a proportion of GDP is only 3.4% as compared to the OECD average of 5.4% (OECD, 2009, p. 224). As well, the proportion of total government education budget devoted to tertiary education is 14% compared with the OECD average of 23% (OECD, 2009, p. 224).

Chile has made up this public spending gap by utilizing private funding from tuition fees, research grants and company contributions to finance its tertiary education system (OECD, 2009, p. 235). Though Chile has been successful in securing private resources for tertiary education to-date, there is strong rationale to increase public spending in tertiary education. Most crucial for Chile is that increased government spending will allow greater access across socio-economic groups, which is essential to rebalancing the income equity gaps that exist within the country, as well as creating a more skilled labor force and economic competitiveness. In addition, Chile needs to bolster tertiary education spending in order to meet OECD expectations.

Utilizing the IFs software to forecast increased government spending on tertiary education for 10 years, from 2010 – 2020, shows fruitful results. As displayed in Figure 1.21, tertiary enrollment as a percentage of total population would increase from 57% to 85% by 2040 (IFs, 2010). In addition, the impact to female enrollment with additional public spending is greater than the impact to male enrollment, as exhibited in Figure 1.22. Female enrollment is projected to increase by 28.9% as opposed to 27.6% for males (IFs, 2010).[5]

[5] Figures 1.21 and 1.22 used gdsedm for tertiary education interpolated to 1.2 from 2010 to 2020 and continued through 2040.

Figure 1.21

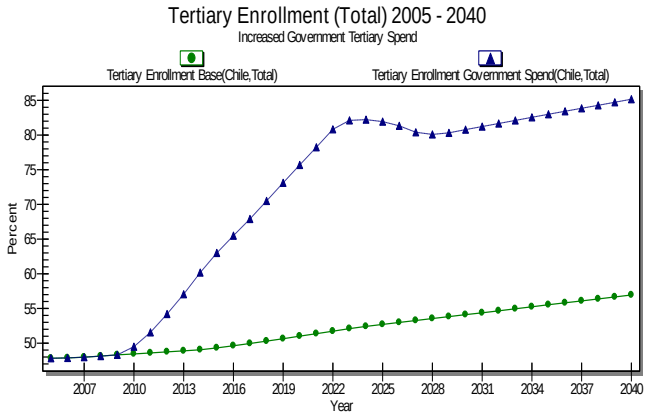
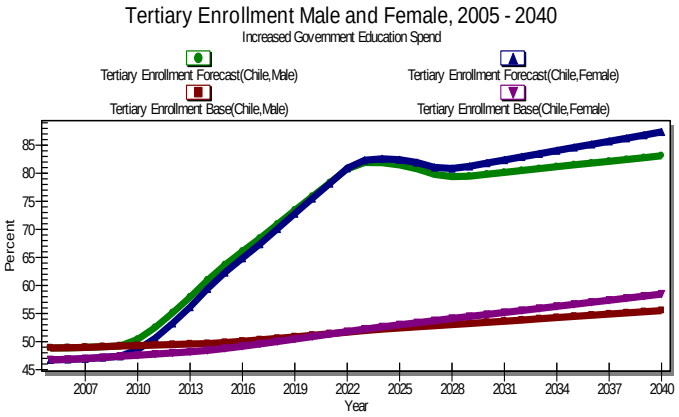


Figure 1.22



As discussed prior, female participation in the labor force is a critical driving indicator that will need to improve in order to close the poverty and income inequality gap. Focusing targeted efforts on increasing female share of the labor force to 50% from the current 39% (OECD, 2009, p. 39) by 2020 does minimally impact the overall labor participation ratio, improving it from 41.0% to 41.7% by 2040 (IFs, 2010).

Moreover, overall labor productivity improvements will also have an effect on labor participation ratio in Chile, as shown in Figure 1.23.[6] Increasing overall labor productivity will increase the labor participation ratio to 45.1%, equivalent to the OECD average labor participation ratio (as a proportion of entire population). Indeed, OECD analysts attribute lagging labor productivity to be the major contributor to income gaps in Chile, with small female labor utilization being of less consequence (OECD , 2010, p. 6). As displayed in Figure 1.24[7], increased tertiary spend positively impacts human capital contribution to multifactor productivity, thus confirming the reasoning to invest in tertiary education in order to impact labor productivity overall.

Figure 1.23

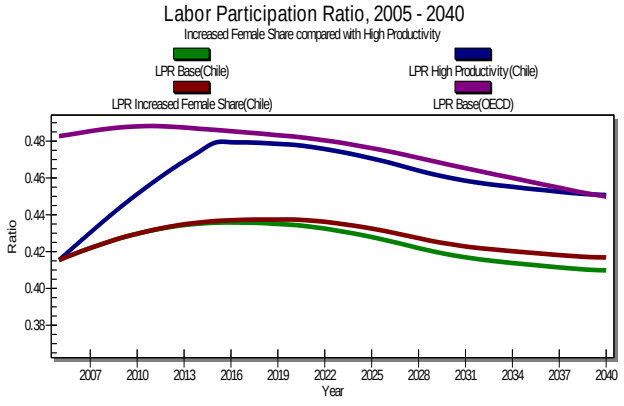
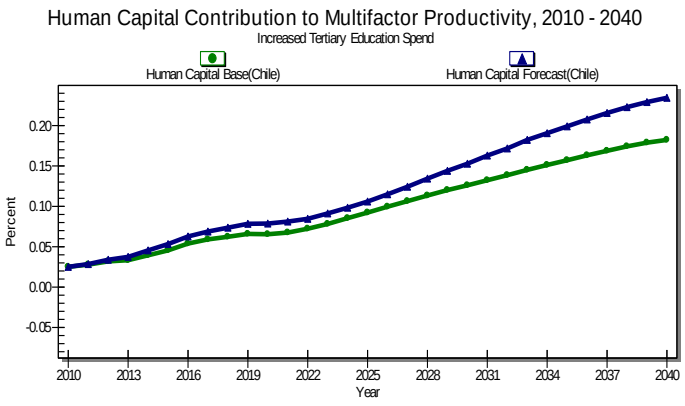


Figure 1.24



[6] Lapoprm was interpolated to 1.1 from 2005 – 2010 and continued through 2040 and femshrmgr interpolated to 50% from 2010 – 2020 and continued through 2040.

[7] Gdsedm was interpolated to 1.2 from 2010 – 2020 and continued through 2040.

Despite the small impact in the IFs model to labor productivity by increasing the female share, female participation in the labor force is a necessary step for sustained economic growth. As mentioned earlier, since female labor participation in Chile is also correlated with education attainment, augmented tertiary education for females will push up the labor participation rate. The labor participation rate of women with over 13 years of education is 74% (OECD, 2009, p. 41), much higher than the average of the entire female cohort. An increase of educated females in the labor market means increased wages and household income, which in turn impacts income inequality. According to a 2006 survey, Chilean university educated individuals receive nearly four times the income of individuals with secondary education alone. A 2002 study found that individuals with completed undergraduate education had twice the possibility of being employed than a person without it (OECD, 2009, pp. 45-46).

Though the IFs model did not demonstrate a notable impact to GDP or Gini coefficient by increased government spend on tertiary education, this intervention in combination with other government courses of action will reap rewards, as discussed later in this analysis.

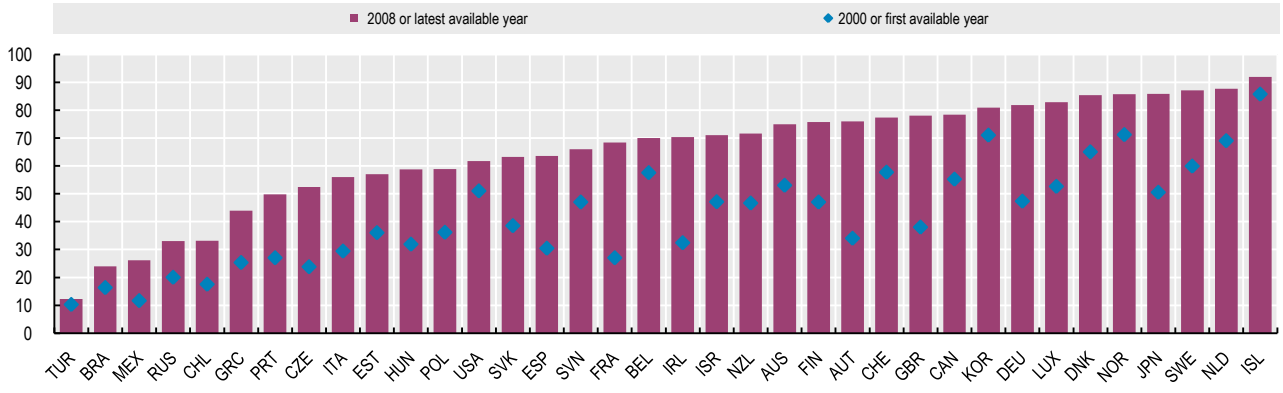
KNOWLEDGE CAPITAL

Increases in labor productivity will be also be achieved by advancing knowledge capital. Innovation increases productivity by creating new products and new or more advanced business processes. Entrepreneurship is often the creator of innovation, thus is also a focus for Chile. Having already increased spending on tertiary education, the second strategy should be directed toward knowledge capital – namely, improving research and development and innovation and incentivizing entrepreneurship in the marketplace.

Chilean spending on R&D from 1997 – 2004 averaged 18.6% growth, however, still failed to compare to OECD levels of investment, as reviewed in Figure 1.14 earlier. As innovation is closely linked to technology in the 21st century, a cursory glance at home computer access in Chile as compared with OECD countries verifies a lack of widespread technology, as shown in Figure 1.25 below. As well, only 19% of households in Chile have access to the internet, while the European Union average is 49% (OECD Stat Extracts, 2010).

Figure 1.25

Households with access to a home computers
As a percentage of all households (OECD Stat Extracts, 2010)



Innovation and technology change are major drivers of economic growth. For Chile to continue to develop, investment by both the government and private sector will need to occur. The country's R&D investments should be closer to 1% of GDP, yet currently are at 0.68% (OECD, 2009, pp. 197-198). Specifically, the Chilean government's contribution to R&D is lagging – enterprises recently surpassed public contributions (OECD, 2009, p. 194).

As an example, looking at a maximum increase of Broadband Technology utilization in Chile advancing from 2010 – 2020 results in nearly 0.6% additional GDP growth rate in 2018 and continues to make a positive impact through 2038, as displayed below in Figure 1.26.[8] As compared with additional R&D expenditure, focus on technology evidences a greater impact on GDP growth within the IFs model, thus technology diffusion as well as R&D need to be expenditure targets. It should also be noted that required investments in university level R&D should overlap with the tertiary education spend recommended earlier to augment overall R&D investments.

As mentioned above, knowledge capital will be a key driver to multifactor productivity improvements, which will in turn improve overall GDP. Combining advanced human capital through education with expanded knowledge capital in the public and private sectors through R&D and Technology expenditures should result in GDP growth due to advanced multifactor productivity, as is evident in Figure 1.27.[9]

Figure 1.26

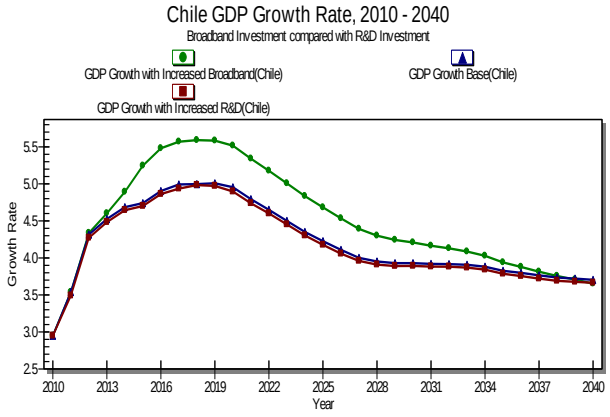
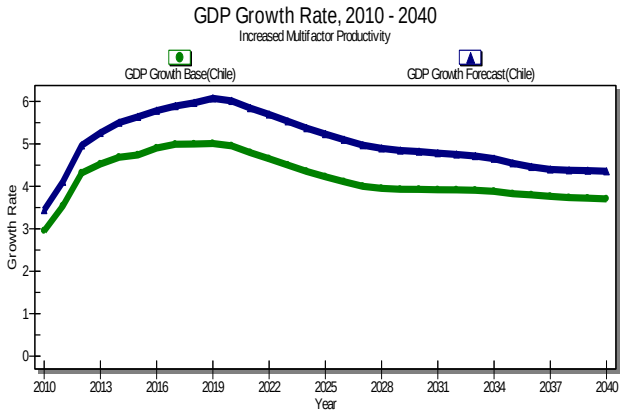


Figure 1.27



PUBLIC SPENDING

In order to continue to sustain a 6% growth rate as claimed by President Pinera and decrease income disparity, Chile will need to increase public spending in the form of welfare. Expanding poverty directed social programs such as 'Chile Soldario' is a necessity for Chile to continue to combat income inequality. If government transfers to unskilled labor are increased as part of Chilean economic policy, the results do demonstrate a reduction in the Gini coefficient as seen in Figure 1.28,[10] however, not to the extent comparable with the OECD average of 0.38.

[8] Mfprandd changed to 0.65 in 2010 and continued through 2040 and ictbroadm interpolated to 3.0 from 2010 to 2020 and continued through 2040.

[9] Mfpadd interpolated to 0.01 from 2010 – 2020 and continued through 2040

[10] Govhhtrnwelm changed to 1.2 from 2010 – 2025 and returned to base from 2026 – 2040.

Though not reflected in the IFs model, household income will also be impacted by the expansion of the labor market mentioned above. Since many of these jobs are targeted toward women, their participation in the workplace will most certainly decrease income inequality.

Using the IFs model to project a 'brute force' reduction in the Gini coefficient reveals the positive impact that income redistribution could potentially have on poverty reduction. As shown in Figure 1.29, the percentage of people in Chile living on less than two dollars per day could be reduced to almost zero by 2020.[11] Though income distribution isn't the only development goal for Chile, the numerous interventions discussed above should all positively impact poverty gaps in Chile: economic growth, human capital and labor participation, knowledge capital and public spending.

Figure 1.28

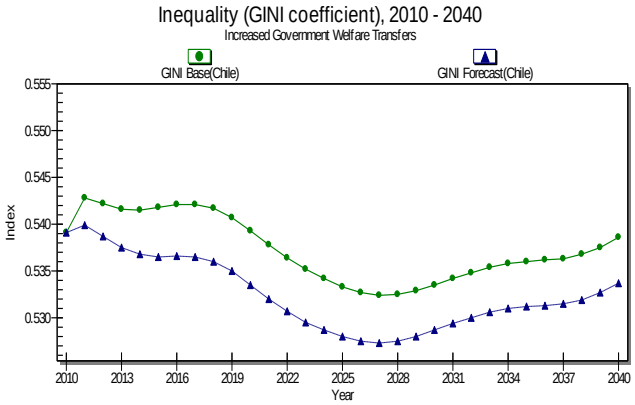
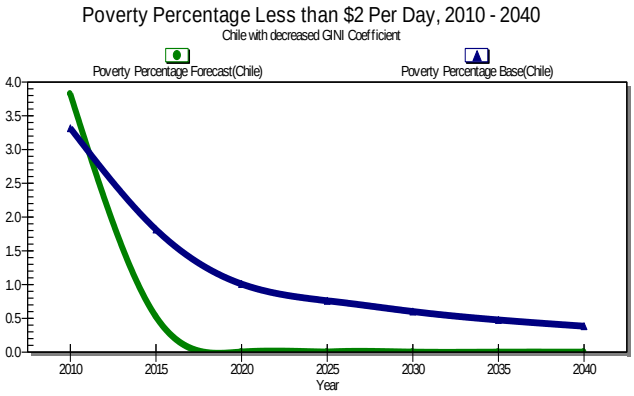


Figure 1.29



According to an IMF review, the Chilean government has committed to restricted government expenditures in 2011 due to heavy earthquake related rebuilding costs (Financial Times, 2010). So where will the funding for these investments in human and knowledge capital and social programs come from? It should come from the structural budget surplus. Chile specifically targeted a reduced surplus in order to fund education initiatives in 2007, prior to the global economic crisis (OECD Online, 2007). Now given Chile's economic return to above average growth in 2010, this reallocation should be feasible.

In addition, incremental tax revenues will play a role in increased public spending. According to OECD recommendations, Chile will need to revise its current tax system, heavily favored toward high-income individuals, in order to create additional funding for education and social programs directed at poverty eradication. The approaches include eliminating current tax exemptions to broaden the tax base, encouraging taxes on private pension and savings and resolving the corporate and income tax loopholes that exist (OECD , 2010, p. 6).

[11] Ginidomr ratio was decreased to result in the following Gini coefficient: 0.54 through 2010 (current value), 0.44 interpolated from 2010 to 2020 and 0.36 from 2020 to 2040.

MULTI-PARAMETER INTERVENTIONS

Governments don't normally operate by making singular economic policy decisions, thus multi-faceted plans are more realistic in complex states and will be more impactful in the long-term. Based on an analysis of the individual parameter changes reviewed above, two multiple parameter interventions produced positive outcomes in the IFs model. Scenario 1 in Figures 1.30 – 1.34 included only tertiary education spending, female labor share increase and broadband expansion.[12] Scenario 2 includes increased government welfare transfers, tertiary education spending, broadband technology growth, female labor share increase, all of which would lead to multifactor productivity growth, which was also included.[13]

It is evident that the multi-pronged approach of Scenario 2 has the most desired outcomes by 2040 – GDP growth rate of 6.4% by 2020, compared with 4.9% base forecast. As well, GDP Per Capita as shown in Figure 1.26 grows to nearly $31,000/capita, as opposed to $24,000/capita base. Though Scenario 1 did have an impact, in this case the inclusion of multifactor productivity growth and government welfare transfers pushed the GDP growth up by an additional 0.7% at its peak. GDP per capita increase can continue to create absolute poverty reductions as it has done in the past for Chile. The question that remains is will the impact be sufficient enough to close the large income gap that persists today.

Figure 1.30

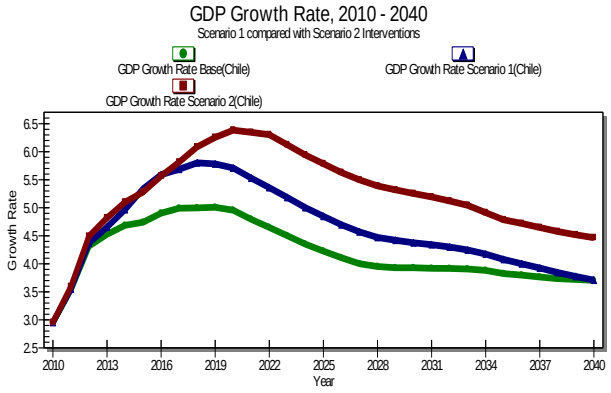
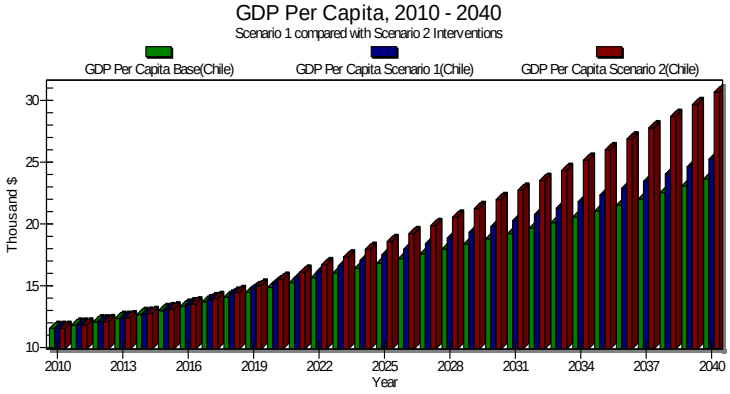


Figure 1.31



Another main goal for Chile discussed at length is improving multifactor productivity. Productivity was cited as a critical gap in the Chilean economy and one of the OECD's primary recommendations for continued economic growth (OECD, 2010, p. 12). As seen in Figure 1.32. below, comparing again Scenario 1 and Scenario 2, but in

[12] Scenario 1 is femshrgr interpolated to 50% from 2010 to 2020 and continued through 2040, gdsedm interpolated to 1.2 from 2010 to 2020 and continued through 2040 and ictbroadm interpolated to 1.2 from 2010 to 2020 and continued through 2040.

[13] Scenario 2 is femshrgr interpolated to 50% from 2010 to 2020 and continued through 2040, gdsedm interpolated to 1.2 from 2010 to 2020 and continued through 2040, govhhtrnwelm interpolated to 1.2 from 2010 – 2015 and continued through 2040, mfpadd interpolated to 0.01 from 2010 – 2020 and continued through 2040 and ictbroadm interpolated to 1.2 from 2010 to 2020 and continued through 2040.

this instance with a pure 'brute force' multifactor productivity scenario,[14] the results are most favorable when utilizing Scenario 2. It appears the combination of multifactor productivity increases with government welfare transfers, tertiary education spend, increased female share of labor force and broadband improvements has the greatest impact on productivity as compared with just increasing productivity itself.

Looking at impact on inequality as measured by Gini in Figure 1.33, Scenario 2 produces the greatest impact compared with Scenario 1, increased Agricultural Demand or increased FDI.[15] What is interesting in these scenarios is that the increase in Foreign Direct Investment actually has a negative impact on the Gini coefficient. This could be attributed to perhaps exacerbating the wealth of the middle class with FDI in Chilean industries that do not directly impact the poor (e.g. agriculture).

Therefore as mentioned earlier, Chile needs to solicit and target FDI to industries that can directly or indirectly impact the poor. Though jobs may be created by additional FDI, those jobs may not be tailored to the extreme poor. However, public expenditures on education and targeted welfare transfers will have an impact on the poverty gap, confirming the need for a multi-pronged policy intervention approach by the Chilean government.

Figure 1.32

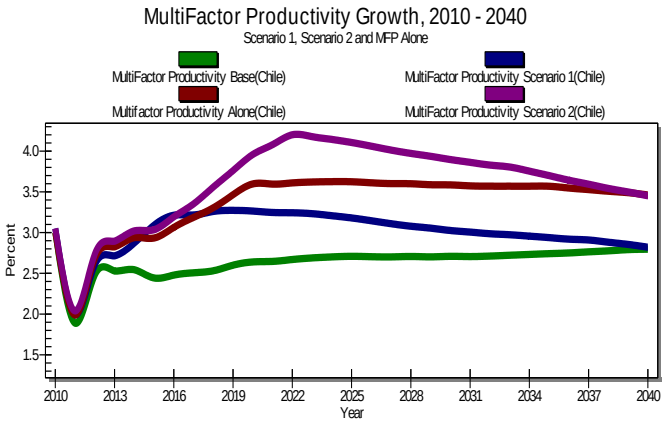
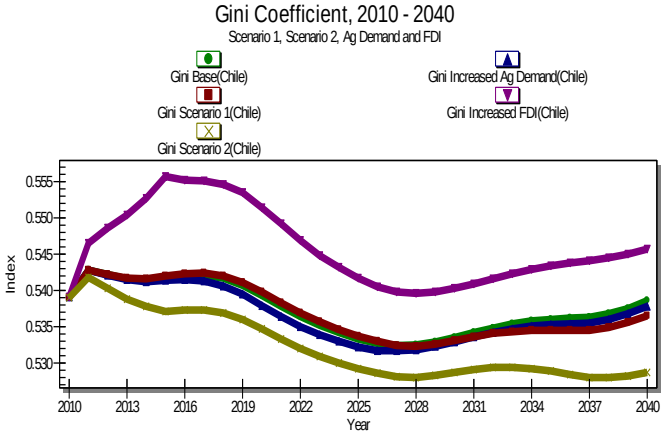


Figure 1.33



Another combination approach that could be pursued by Chile is based on soliciting targeted FDI and focusing government expenditures on agricultural exports, technology advancements (broadband) and direct welfare transfers. This is Scenario 3 in Figure 1.34. below.[16] Despite Scenario 2 still having the greatest impact on GDP

[14] Mfpadd interpolated to 0.01 from 2010 – 2020 and continued through 2040.

[15] Agdemm was increased for both crop and meat in Chile, interpolating from 1 to 1.2 from 2010 – 2015, and then a continuous multiplier of 1.2 from 2015 – 2040 and xfdistockm was increased to 1.2, interpolated from 2010 to 2015 and sustained at 1.5 through 2040.

[16] Scenario 3 is agdemm increased for both crop and meat in Chile, interpolating from 1.0 to 1.2 from 2010 – 2015, and then a continuous multiplier of 1.2 from 2015 – 2040, xfdistockm increased to 1.2, interpolated from 2010 to 2015 and sustained at 1.5 through 2040, govhhtrnwelm changed to 1.2 from 2010 – 2025 and returned to base from 2026 – 2040 and ictbroadm interpolated to 1.2 from 2010 to 2020 and continued through 2040.

growth, Scenario 3 also had a significant impact, improving GDP growth percentage by 0.8% at its peak over the base. Understanding that government funding is limited and must be prioritized based on the economic agenda, the Scenario 3 interventions would also accomplish an improved GDP growth rate as well as most likely improve job creation with increased FDI.

Finally, as shown in Figure 1.35, the impact to multifactor productivity when comparing Scenarios 2 and 3 is revealing. Though Scenario 2 has the most impact on multifactor productivity, Scenario 3 also has a notable impact yet of shorter duration. Since Scenario 2 included a 'brute force' increase in multifactor productivity but Scenario 3 did not, the conclusion can be drawn that both sets of policy interventions would be successful in impacting multifactor productivity and GDP growth, but in different ways; Scenario 2's success is geared toward female labor participation and education spending while Scenario 3's impact is focused toward FDI increases and improvements in agricultural yield and exports. The bottom line is there are multiple, diverse opportunity areas and mechanisms to continue the development growth trajectory in Chile.

Figure 1.34

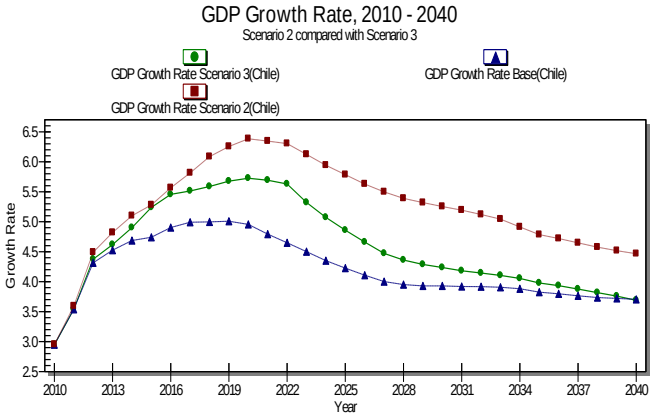
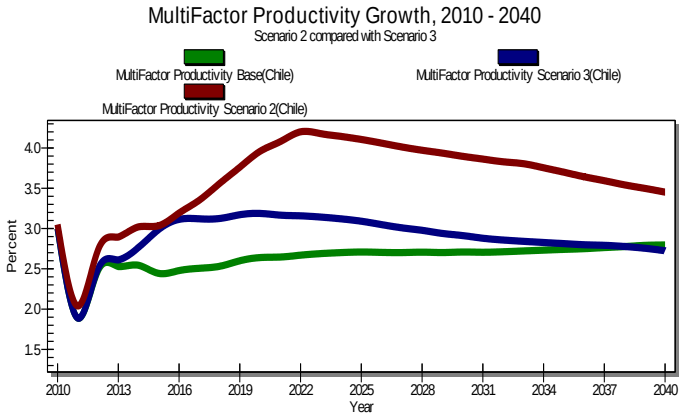


Figure 1.35



CONCLUSION

Pinera's plan to make Chile a 'developed' country by 2018, primarily by achieving 6% growth and creating one million jobs during his four year tenure (The Economist Online, Right Again, 2010) will depend on the success of its implementation. Looking at the current trajectory of key opportunities, the government has a jump start in the right direction with currently high GDP growth rates and job creation to-date. However, without specific and targeted interventions, it will be difficult for Chile to economically match its OECD peers even by the year 2040.

Given 30 years of potential runway to achieve these goals, it seems aggressive but reasonable to progress close to OECD averages if the aforementioned policies are pursued. An analysis of historical and forecasted data in Chile revealed human capital and labor participation improvement, deliberate public spending increase and investment, and knowledge capital advancement as the keys to economic success for Chile in 2040. It is apparent looking at policy interventions utilizing the IFs forecasting software that the Chilean government will want to follow a multi-faceted socioeconomic policy approach that continues to sustain GDP growth at 5% or greater and that decreases income inequality, as measured by the Gini coefficient, to under 0.4, thereby approaching OECD standards.

Recently 33 copper miners were rescued after over two months trapped in a collapsed mine. At the same time, the Chilean government kicked off an increased mining taxation program, with the goal of raising $1 billion USD for regional, health and education spending (Financial Times, 2010). This seems to be a wise move given that mining industry taxes were lax before, and looking forward at the critical investments the Chilean government needs to make in order to continue sustained economic growth and to achieve the goal of the 'first developed Latin American nation.' Based on this analysis, careful and deliberate investments in tertiary education, direct welfare programs, R&D and technology should positively impact female labor participation and multifactor productivity. These strategies will foster sustained GDP growth as well as reduce income inequality in Chile by 2040.

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