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Heterogeneous Effects of Commodity Price Shocks on Inflation Rates. Evidence from a Panel Study.

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Heterogeneous Effects of Commodity Price Shocks on Inflation Rates. Evidence from a Panel Study.

Master's Thesis
International and Development Economics

Key Words: *Commodity prices, Exports, Imports, Inflation*

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May 2014

Abstract: Do commodity price shocks have heterogeneous effect on countries based on their export and import profiles? I address this question through a panel study of 142 countries using Export and Import Indexes aimed at differentiating the retail pass-through and fiscal balance channel of transmission of Commodity Price shocks on inflation. The results show that an increase in the Export Index leads to a decrease in contemporary inflation while an increase in the Import Index leads to an increase in inflation in the next year. Average causal mediating effect of the Export Index on Inflation through the Fiscal Balance was shown to be negative.*

1. Introduction

Inflation plays a big role in the lives of the poor around the world. The poor have limited access to banking services, this leaves them unable to offset their losses to inflation. Beck (2007) has found that people in the Least Developed Countries (LDCs) have significantly lower access to banking services than people in Developed Countries. The recent episode of hyperinflation in Zimbabwe ,as analyzed by Coomer (2011), is the most outrageous example of government mismanagement of the money supply. Wines (2006) reports anecdotal evidence of negative impacts on the residents of Zimbabwe. However one does not have to experience hyperinflation to incur losses to welfare from inflation. Fujii (2013) found evidence that the poor are especially vulnerable to inflation and especially food inflation. Easterly (2001) found in an extensive survey that the poor name inflation as their top economic concern. Cardoso (1992) argues that the poor in Latin American countries are not affected by inflation because their cash holdings are too small.

In 2011 atleast 25 countries in the world experience double digit inflation according to the World Bank and all of those countries are in the Developing World. This causes the poor to lose purchasing power or change their purchasing decisions to offset inflation. The poor, in the absence of banking services, may choose to buy consumer durables to offset inflation. Even this move will still net them a loss in welfare as the consumer durable good earns a negative return equal to its depreciation. Easterly (2001) found that inflation reduced the real wage of the poor and states that inflation is a "cruel tax" on the poor.

The earliest look at inflation was done by Phillips (1958) who found a relationship between inflation and unemployment in the United States between 1861 and 1958. This finding was embraced by the Keynesian economists of the early half of the 20th century. However the hyperinflation of the 1970s in the United States and the complete breakdown of the Phillips curve in empirical testing after 1960s opened the door for the Quantity Theory of Money. Gali (1999) and other economists are still trying to revive the idea of the Phillips curve.

The dominant theory on inflation today considers it as purely a monetary phenomenon. This theory is based on the Quantity Theory of Money and was brought back to attention by Friedman (1953). This theory says that the only determinants of the inflation rate are the relative supply of money and goods in the economy. Friedman also suggested a constant money supply growth rule to help combat inflation.

Beginning roughly in the 1990s the world has experienced a noticeable drop in inflation rates among all countries. This caused the policymakers and academics to look for the cause of this change. Some speculated that the adoption of the Taylor Rule, introduced in Taylor (1993),

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was the cause of this drop in inflation around the world. Alesina and Summers (1993) believed it was the heterogeneity in central bank independence that could explain this sudden change. Romer (1993) and Lane (1997) argued that increased openness of the economy also increased the cost of unexpected inflation and therefore reduced the temptation to engage in excessive money supply increases. The famous Lucas (1976) critique of backward looking economic models created a new paradigm in economic models of inflation.

With the introduction of forward-looking expectations money supply alone cannot be sufficient in explaining the inflation dynamics of many countries. To this line of thought Sargent and Wallace (1981) predicted that the ability of the monetary policy to target inflation may only be effective with coordination with fiscal side of economic policy. Sargent and Wallace (1981) predicted that tight monetary policy could lead to a higher inflation rate under certain conditions. With a given demand for government bonds and no changes in future fiscal policy some of the debt has to be inflated away using seigniorage.

Related to Sargent and Wallace (1981) is the Fiscal Theory of the Price Level, which was developed by Leeper (1991), Sims (1994) and Woodford (1994). The Fiscal Theory of the Price Level argues that an increase in government deficits has an effect on the price level. Empirical work in Catao (2005) showed a strong association between deficits and inflation among high inflation developing countries.

Inflation plays a big role in the decision making function of households, individuals and companies. One such example is the impact of inflation in lowering real wages and reducing rigidity in wages of labor markets. Wage rigidity was shown to be nominal in nature and only reduced by inflation. Nominal inflation was shows not to decrease even in times of drought. Thus workers were unwilling to accept lower wages even in tough times. (Kaur 2012) Therefore inflation serves a very important function in reducing unemployment during recessions. Inflation was shows to " grease the wheels" of labor markets as predicted by Tobin (1972). One way through which inflation influences the decision making of poor individuals could be the propagation effect of price shocks in a specific product group. Propagation happens when a price hike in one product group also affects the prices in other product groups. Pedersen (2010) found that price shocks in food products resulted in higher propagation than price shocks in energy products, also emerging countries are more affected by propagation than advanced.

Commodity price increases may not even lead to inflation in every case. In this seminal paper Mankiw (1985) set forth the model which looks at the effect of "menu costs" on the pricing decisions of firms based on an increase in underlying costs. "Menu cost" is the cost of

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printing a new menu or the cost of changing the price of the firm's product in every outlet. This cost has an effect on the firm's decision to change the price of its product based on the increase in underlying costs. Therefore firms may or may not shift the higher cost to consumers based on the degree of price increase. There is extensive literature in microeconomics that looks at the ways that companies shift the increasing costs of raw commodities to the customers, which results in inflation. This argument was extended by Christiano et al. (2005) who looked at the impact of expansionary monetary policy shock on marginal output. Christiano et al.(2005) determined that staggered wage contracts and variable capital utilization impacted the degree to which inflation expectations were driving changes in real marginal costs. Rigobon (2010) used micro price data to test how much of the underlying raw material cost increases was passed on to customers. Rigobon (2010) found that sectors responded differently across countries and commodities. Therefore different characteristics of each sector have an impact on the pass through of commodity price shocks.

Exporting countries may be affected differently by a rise in underlying costs compared to net raw commodity importers. This may not be a simple case of higher raw inputs leading to higher inflation for every country. Zoli (2009) found that international commodity price shocks have a significant impact on domestic inflation, however the effect of commodity price shocks was asymmetric to inflation in a panel of 18 European countries. Previous studies of commodity prices looked at the retail pass-through channel and assumed homogeneous effects on inflation and could not reach a consensus. Awokuse and Yang (2002), Cutler et al.(2005) and Jumah and Kunst (2007) found that commodity prices do affect inflation while Blomberg and Harris (1995), and Furlong and Ingenito (1996) found that commodity prices do not affect inflation.

Previous work on commodity prices focused on growth rates Deaton (1999) and the Resource Curse Auty (1993). My approach also differs from existing literature on budget deficits and inflation (Elmendorf,1993; Catao and Terrones, 2005) by introducing heterogeneous effects of commodity price shocks on inflation and budget deficits through the Export Index and the Import Index approach. The intuition behind this approach is that a rise in the price of a certain commodity will only have an effect on the country's inflation rate if the country exports or imports that commodity.

Using this approach I find that an increase in the Export Index leads to a decrease in the inflation rate, while an increase in the Import Index leads to an increase in the inflation rate. The Export Index has a negative contemporary effect on the inflation rate through the Fiscal Balance channel. The Import Index has a positive effect on the inflation rate in the following

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year through the retail pass-through channel. The effect of the Export Index varies by the country's income group level and by the level of inflation in the country.

Following this introduction, Section 2 of my paper presents a description of the methodology and the econometrics model used in this paper. Section 3 describes the data used in this paper. Section 4 presents the results and Section 5 summarizes and concludes.

2. Methodology

2.1 Commodity Price Index

At the core of my approach is the Commodity Price Index. In this paper I am following the methodology first used by Deaton (1999). I construct a country specific commodity Export and Import Price Index that captures exogenous shocks to commodity prices :

$$\text{CommodityIndex}_{i,t} = \prod_{c \in C} \text{ComPrice}_{c,t}^{\theta_{i,c}}$$

where $\text{ComPrice}_{c,t}$ is the price of commodity c in year t. $\theta_{i,c}$ is the average export or import weight assigned to each commodity. These weights are based on the time invariant value of exports or imports of a commodity in the GDP of the country i. This functional form of the commodity price index follows common practice in the literature, for example Collier(2007). Using this approach I can create a unique index that captures the relative value of Exports or Imports to each country. This allows me to introduce heterogeneous effects to the underlying changes in global commodity prices by differentiating between the retail pass-through channel of import commodity prices and the impact of export commodity prices on the inflation rate. I used time invariant weights to get around the limitations of the data and also to establish a unique profile of a country that is based on the average amount of a commodity exported/imported as a share of GDP over 30 years. I created the index using local currency and US dollars to test if the variation in the Index is coming from price changes in the underlying commodities or changes in the exchange rate. Following Deaton (1999) the commodities in question are aluminum, beef, coffee, cocoa, copper, cotton, gold, iron, maize, oil, rice, rubber, sugar, tea, tobacco, wheat and wood.

2.2 Estimation Strategy

To examine heterogeneous effects of commodity prices on inflation, I estimate the following econometric model where the within-country change in the log of the Consumer Price Index ($\Delta\text{logCPI}_{i,t}$) is related to the within-country change in the log of the Export ($\Delta\text{logExportIndex}_{i,t}$) and the Import Index ($\Delta\text{logImportIndex}_{i,t}$):

$$\Delta logCPI_{i,t} = \gamma_1 \Delta logCPI_{i,t-1} + \gamma_2 \Delta logExportIndex_{i,t} + \gamma_3 \Delta logExportIndex_{i,t-1} + \gamma_4$$
$$\Delta logImportIndex_{i,t} + \gamma_5 \Delta logImportIndex_{i,t-1} + \gamma_6 \Delta logManufacturedIndex_t + \gamma_7 \Delta$$
$$logManufacturedIndex_{t-1} + \gamma_8 \Delta logExchangeRate_{i,t} + \gamma_9 \Delta logM2_{i,t} + \gamma_{10} \Delta logM2_{i,t-1}$$
$$+ \gamma_{11} \Delta logGDPGap_{i,t} + \alpha_i + \beta_t + \mu_{i,t}$$

In the above equation the inflation rate of a country is defined as the log change in CPI. α_i are country fixed effects that capture time invariant country specific unobserved variables and β_t are year fixed effects that capture common year shocks. $\mu_{i,t}$ is the error term clustered at the country level. I use the change of the log of the Export/Import Indexes to ensure that within-country variations in the Export/Import Indexes are due to percentage changes in the local currency commodity prices. Manufactured Goods Index is a measurement of the import price of manufactured goods and is calculated in US dollars. GDP Gap , M2 , Exchange Rate , CPI and the Export/Import Indexes are calculated in local currency.

In the baseline regression I estimate the average marginal effect of commodity price fluctuations on CPI inflation by using the largest possible sample size. Later I split up the sample by income groups and level of inflation to test for heterogeneity in the marginal effects.

3. Data:

Data on annual international commodity prices for the 1970-2009 period was obtained from UNCTAD Commodity Statistics (UNCTAD,2009). Data on the value of Commodity Exports and Imports is from NBER-United Nations Trade Database (Feenstra *et al.*, 2004). Commodities used in the index are aluminum, beef, coffee, cocoa, copper, cotton, gold, iron, maize, oil, rice, rubber, sugar, tea, tobacco, wheat and wood. For some commodities multiple prices were listed, I used a simple average of those prices. Data on the price of iron was not available for 2010-2013 years, this reduced my sample time frame to 1970-2009. Additionally the data on commodity Exports/Imports had multiple entries for some commodities, only the category describing raw commodities was used. The methodology by Deaton (1999) called for using the average time invariant weights, this helped overcome some missing data problems in the value of Exports/Imports database. NBER-United Nations Trade Database does not report zero values, thus one cannot differentiate between missing values and 0 commodities Exported/Imported. Additionally I tested for changes in the export profile of a country through time by creating an index based on export weights in the 1990s. The results were similar to the index using the average of 1970-2000 annual weights. Table 2 presents the country list and the sum of Export weights for that country. Resource rich countries have

highest weights in the sample, while a developed country like the United States has weights close to 0.

Macroeconomic data is mostly from the International Financial Statistics (IFS) database of the IMF. Additionally data from World Bank's World Development Indicators was used. The data set covers 142 countries and up to 38 annual observations per country. The definition of money supply is M2. Fiscal Balance data is from Catao (2005). Fiscal Balance data from the IMF only included deficit data from the central government and did not include state or local governments. Using more comprehensive data from Catao (2005) increased my Fiscal Balance observations from 1400 to 2800.

4. Results:

3.1 Main results

Table 3 shows the main results. In this table all variables are in log changes and local currency, except for the Manufactured Goods index which is in US dollars. The coefficients on the Manufactured Goods Index and the first lag of the Manufactured Goods Index is positive and significant at 1%. This suggests that an increase in the cost of manufactured goods leads to an increase in inflation. This finding is consistent with economic theory and expectations. The coefficient on the Exchange Rate is positive and significant, this suggests that an increase in the Exchange Rate is associated with an increase in the inflation rate. This is consistent with economic theory and is significant with the addition of other covariates. The changes in M2 is correlated with an increase in the inflation rate in both contemporary and next years. This result confirms the monetary theory of the money supply as the main driver of inflation. The first lag of the inflation rate is added to capture any possible omitted variables, this follows the methodology of Kwon (2008).

The coefficient on the log of the Export Index is negative in the contemporary case and is not significant in the first lag. This suggests that an increase in the Export Commodity Index is associated with a reduction in the inflation rate in the current year. This result suggests that the Price of Exported Commodities affects inflation differently from the Price of Imported Commodities. The coefficient is negative and significant at 1% level even with the addition of covariates.

The coefficient on the log of the Import Index is positive and significant in column 3 of Table 3. The coefficient of the first lag of the Import Index is positive and significant at 5% level. This result is consistent with the retail pass-through channel of transmission of Import

Commodity Prices on inflation in a country. This result also confirms heterogeneous effect of commodity prices on inflation based on the Export/Import profile of that country. However this result is not significant when the first lag of the inflation rate is added in column 4 and 5. The regressions in Table 3 have between 4011 and 3783 observations with the number of countries ranging from 141 to 138. Country fixed effects and year fixed effects have been used to test for country specific and year specific shocks to inflation. The high R-squared suggests that the model is properly specified. Additionally the time trend was introduced to capture and reduction in global inflation due to the time trend.

Table 4 uses the Export and Import Indexes in US dollar currency to test whether the results in Table 3 come from changes in the underlying price of the commodities or the change in the relative Exchange Rates of each country. The coefficients on the Export Index are similar and significant at 1% level. The different size of the coefficient can be explained by the different base of the US Dollar and the Local Currency Indexes. The coefficient on the Import Index is significant only at the 10% level now, before the inclusion of the first lag of inflation.

Table 5 breaks down the sample into four different income groups based on the classification by the World Bank. The local currency Export Index has a negative coefficient in Lower Income , Middle Income and High Income OECD countries, but is not significant in the High Income non OECD group. This suggests that Low and Middle Income countries experienced reduction in their inflation rates when their Export Index increased. However this effect disappears in the High Income non OECD case. This can be explained by the make of countries in the High Income non OECD group, which consists mostly of wealthy oil exporting countries in the Middle East, Russia and are known for their weak institutional quality.

Table 7 breaks down the sample by their inflation rates. The results show that countries with highest observed inflation rates experience the largest effects of Export Index on inflation. This is consistent with the deficit channel of mediation, as theory suggests that countries that have large and chronic deficits experience high inflation. Countries that generally have low levels of inflation they are not likely to be affected by the Export Index. The coefficient of the Export Index in column 4 and 5 differ greatly in size. This suggests that most of the result comes from countries that have large and chronic deficits, which improve their Fiscal Balance by using commodity Export revenue.

Table 6 shows that Fiscal Balance is the most likely channel of mediation in the Export Index case. Fiscal Balance is defined as Deficits/Surplus as a share of GDP in local currency. I assume that Export Commodity Prices are exogenous for most countries in the sample, as small

countries that export raw commodities do not have enough market power to influence the price of a commodity. Figure 1 shows a diagram of the Fiscal Balance channel and explains how an exogenous change in the price of an export commodity can lead to an increase in the Fiscal Balance of a country. An improvement in the Fiscal Balance of a country then reduces inflation as shown by Catao (2005). Column 1 of Table 6 shows that an improvement in the Fiscal Balance leads to a reduction in the inflation rate in the current year. Column 2 of Table 6 shows that an exogenous increase in the Export Index leads to an improvement in the Fiscal Balance. Using methodology by Imai (2011) in *American Political Science Review* the Average Causal Mediating Effect (ACME) was calculated using the coefficient multiplication approach. Assuming Sequential Ignorability and No-Interaction assumptions ACME is asymptotically consistent and equal to -0.02. Figure 2 shows that ACME is negative and significant at the $\rho=0$. Sequential Ignorability is a valid assumption in the Fiscal Balance channel as all arrows point outward from the Fiscal Balance except for the Export Index.

5. Summary and Conclusions

Commodity prices were shown to have heterogeneous effects on inflation rates based on the Export and Import profile of each country. Countries that experience an increase in their Export Index were shown to experience a decrease in their inflation rate. Countries that experienced an increase in their Import Index last year were shown to experience an increase in their inflation rate current year. This confirms the retail pass-through channel for the import case. For the export case Fiscal Balance was shown to have a negative Average Causal Mediating Effect on inflation. The effect of the Export Index on inflation varies by the country's income level , institutional quality and the overall level of inflation.

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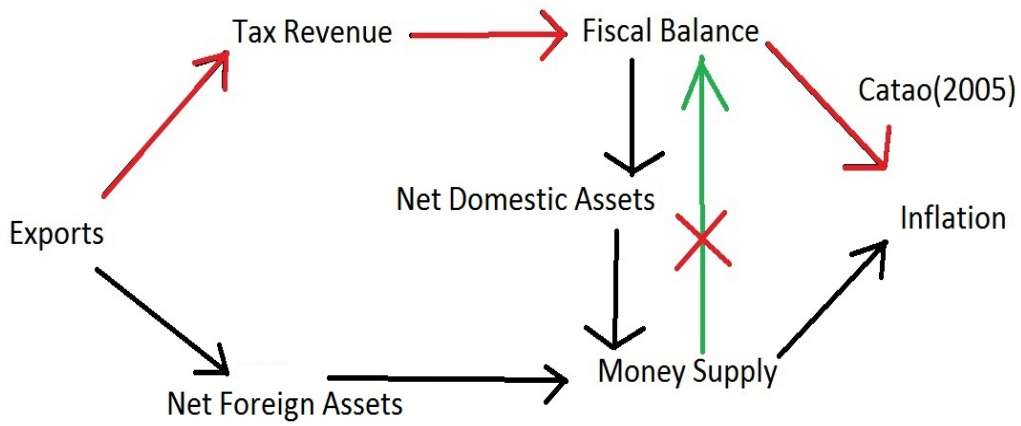
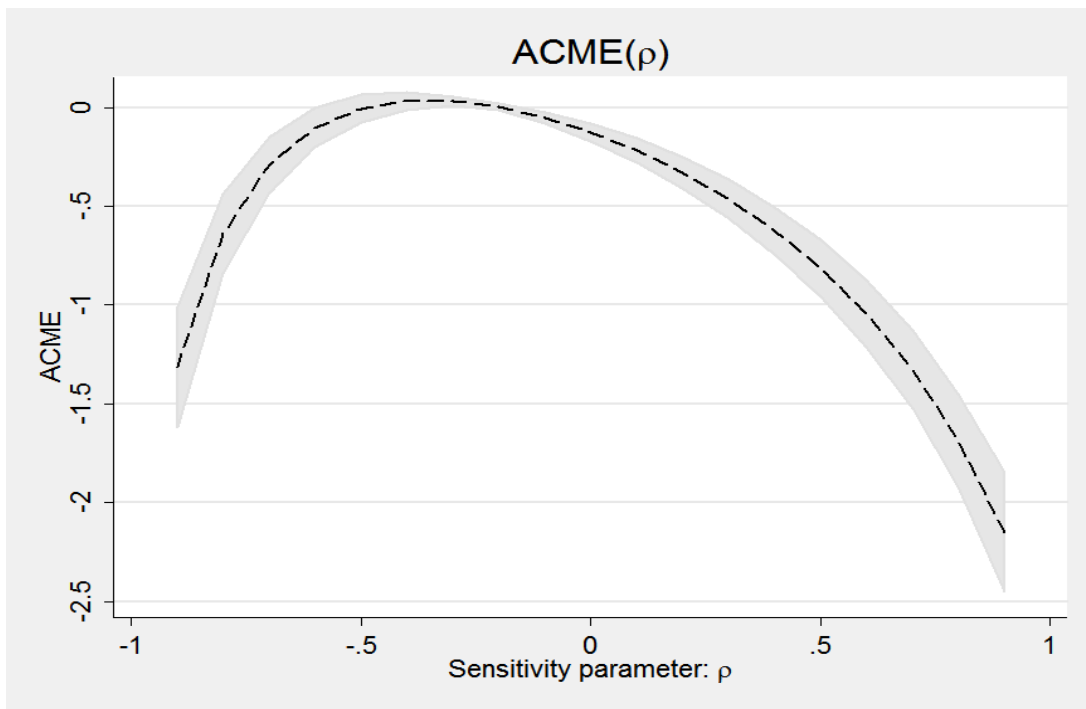**Figure 1:** Exports Affect Inflation Through the Fiscal Balance Channel

Figure 2: Average Causal Mediating Effect Sensitivity Test

Table 1: Summary Statistics

Variable	Observations	Currency	Mean	Standard Deviation	Min	Max
Economic Variables:						
Inflation	4446	Local Currency	0.1446619	0.3255697	-0.1940755	5.475339
Log Export Index	5398	Local Currency	0.0144078	0.0934506	-1.963419	3.100665
Log Export Index	5398	US Dollars	0.0053202	0.045106	-0.3999	0.7624545
Log Import Index	5363	Local Currency	0.0044073	0.0351747	-0.6074882	1.328035
Log Import Index	5398	US Dollars	0.0025645	0.0335677	-0.6074882	1.276211
Log Manufactured Goods Index	5559	US Dollars	3.817188	6.566289	-6.202695	21.86495
Log Exchange Rate	5398	Local Currency	0.0999363	0.402206	-6.907711	8.83407
Log M2	4725	Local Currency	0.2012442	0.331344	-6.173557	4.837324
GDP Gap	2541	Local Currency	-2.974909	2.747968	-12.16874	3.659877
Fiscal Balance /GDP	2878	Local Currency	-3.733362	4.871619	-41.2208	18.2693
Commodity Prices:						
Aluminum	5559	US Dollars	1433.646	519.1424	589.6083	2637.799
Beef	5559	US Dollars	98.44349	19.72729	59.16167	130.9417
Cocoa	5559	US Dollars	78.12024	32.62162	24.43	171.8567
Coffee	5559	US Dollars	100.094	42.43009	43.63083	229.2125
Copper	5559	US Dollars	2375.438	1502.586	1070.592	7117.229
Cotton	5559	US Dollars	132.7523	32.11618	28.7208	205.335
Oil	5559	US Dollars	25.4639	19.49223	2.11	97.01667
Gold	5559	US Dollars	357.4106	193.1355	35.93833	973.0044
Iron	5559	US Dollars	33.47179	23.83855	9.84	134.41
Wood	5559	US Dollars	546.3029	253.2249	123.2994	998.4103
Rice	5559	US Dollars	304.055	113.987	129	700.1667
Rubber	5559	US Dollars	1028.991	480.7345	332.4677	2618.299
Sugar	5559	US Dollars	10.66829	5.446826	3.674167	29.70167
Tobacco	5559	US Dollars	2660.281	714.8834	1055.333	4235.284
Wheat	5559	US Dollars	153.4065	50.05078	54.84167	343.2042

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Table 2: List of Countries in the Sample and a measure of Commodity Exports/GDP ratio.

Country		Country		Country		Country	
Oman	0.6	Syria	0.111	Azerbaijan	0.038	Lithuania	0.007
Qatar	0.587	Ghana	0.111	Sudan	0.036	Poland	0.007
Angola	0.475	Uganda	0.111	Australia	0.034	Bahamas	0.006
Guyana	0.454	Papua N.Guin	0.11	Mexico	0.034	Malta	0.006
Kuwait	0.446	Ecuador	0.089	Ireland	0.033	Hungary	0.006
Saudi Arabia	0.445	Guatemala	0.086	Ethiopia	0.029	India	0.005
Nigeria	0.369	Seychelles	0.085	Malawi	0.023	Gambia	0.005
Suriname	0.356	Tajikistan	0.084	New Zealand	0.023	Finland	0.005
Iraq	0.345	Honduras	0.084	Philippines	0.023	Croatia	0.005
Congo	0.342	Egypt	0.084	Pakistan	0.022	Slovenia	0.005
Gabon	0.342	Costa Rica	0.081	Burkina Faso	0.022	Senegal	0.004
St.Kt-Nev-An	0.288	Togo	0.08	Bolivia	0.021	Romania	0.004
Zambia	0.284	Burundi	0.078	Cambodia	0.021	Mongolia	0.004
Untd Arab Em	0.28	Norway	0.074	Brazil	0.02	Israel	0.004
Liberia	0.27	Viet Nam	0.072	Ukraine	0.02	Switz.Liecht	0.004
Libya	0.267	Dominican Rp	0.071	Canada	0.02	Albania	0.004
Yemen	0.259	GuineaBissau	0.07	Zimbabwe	0.019	Nepal	0.004
Eq.Guinea	0.239	Colombia	0.068	Kyrgyzstan	0.019	Czech Rep	0.003
Iran	0.231	Chad	0.061	Sri Lanka	0.019	Djibouti	0.003
Cote Divoire	0.194	Cent.Afr.Rep	0.057	Estonia	0.018	Jordan	0.003
Guinea	0.164	Mali	0.053	Panama	0.017	Sweden	0.003
Mauritius	0.161	Sierra Leone	0.051	Niger	0.016	Bosnia Herzg	0.003
Belize	0.155	Benin	0.051	Bahrain	0.016	Korea Rep.	0.003
Kazakhstan	0.145	Latvia	0.05	Mozambique	0.015	Slovakia	0.003
Trinidad Tbg	0.144	Paraguay	0.05	South Africa	0.014	Armenia	0.003
Cameroon	0.144	Singapore	0.048	Netherlands	0.014	Belarus	0.002
Malaysia	0.143	Rwanda	0.048	UK	0.014	USA	0.002
Venezuela	0.141	Kenya	0.046	Bulgaria	0.013	Cyprus	0.002
Algeria	0.14	Thailand	0.046	Samoa	0.012	Italy	0.001
Fiji	0.131	Tunisia	0.044	Argentina	0.011	Morocco	0.001
Jamaica	0.13	Peru	0.043	Georgia	0.011	Lebanon	0
El Salvador	0.121	Madagascar	0.043	China	0.009	Iceland	0
Nicaragua	0.119	Barbados	0.043	Denmark	0.009	Japan	0
Indonesia	0.117	Russian Fed	0.042	Lao P.Dem.R	0.008	Bangladesh	0
Dem.Rp.Congo	0.115	Tanzania	0.04	Turkey	0.008		
Mauritania	0.111	Uruguay	0.04	Haiti	0.007		

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Table 3. Effect of Commodity Price Shocks on Inflation
Local Currency Index
---OLS Estimates, Clustered Standard Errors---

	Dependent Variable: Inflation				
	(1)	(2)	(3)	(4)	(5)
Exports					
Δ Log Export Index	-0.460***	-0.486***	-0.486***	-0.476***	-0.476***
	(0.0959)	(0.103)	(0.103)	(0.106)	(0.106)
Δ Log Export Index, t-1	0.0202	0.0328	0.0328	-0.0179	-0.0179
	(0.0597)	(0.0623)	(0.0623)	(0.0702)	(0.0702)
Imports					
Δ Log Import Index	-0.0336	-0.0409	-0.0409	-0.0469	-0.0469
	(0.0453)	(0.0459)	(0.0459)	(0.0450)	(0.0450)
Δ Log Import Index, t-1	0.0859**	0.0807**	0.0807**	0.0237	0.0237
	(0.0409)	(0.0401)	(0.0401)	(0.0396)	(0.0396)
Δ Log Manufactured Goods Index	0.0155***	0.0133**	0.00841***	0.0161***	0.00875***
	(0.00226)	(0.00543)	(0.00130)	(0.00558)	(0.00133)
Δ Log Manufactured Goods Index, t-1	0.0746***	0.054	0.0116***	0.0749*	0.0109***
	(0.0128)	(0.0386)	(0.00218)	(0.0392)	(0.00210)
Δ Log Exchange Rate	0.489***	0.496***	0.496***	0.482***	0.482***
	(0.0328)	(0.0338)	(0.0338)	(0.0358)	(0.0358)
Δ Log M2	0.306***	0.305***	0.305***	0.293***	0.293***
	(0.0288)	(0.0295)	(0.0295)	(0.0310)	(0.0310)
Δ Log M2, t-1	0.216***	0.214***	0.214***	0.125***	0.125***
	(0.0227)	(0.0232)	(0.0232)	(0.0193)	(0.0193)
GDP Gap		-0.00818	-0.00818	-0.00121	-0.00121
		(0.0136)	(0.0136)	(0.0139)	(0.0139)
Trend			0.000943		0.00142
			(0.000866)		(0.000883)
Inflation, t-1				0.132***	0.132***
				(0.0341)	(0.0341)
Constant	-0.540***	-0.419*	-0.159***	-0.539**	-0.146***
	(0.0903)	(0.239)	(0.0236)	(0.243)	(0.0227)
Observations	4011	3818	3818	3783	3783
Number of Countries	141	140	140	138	138
R-squared	0.898	0.901	0.901	0.906	0.906
Country FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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Table 4. Effect of Commodity Price Shocks on Inflation
US Dollar Index
---OLS Estimates, Clustered Standard Errors---

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Dependent Variable: Inflation			
Exports							
Δ Log Export Index	-0.204*** (0.0566)	-0.204*** (0.0566)	-0.149*** (0.0504)	-0.137** (0.0569)	-0.137** (0.0569)	-0.124** (0.0535)	-0.124** (0.0535)
Δ Log Export Index, t-1	-0.294*** (0.0467)	-0.294*** (0.0467)	-0.0486 (0.0495)	-0.0214 (0.0598)	-0.0214 (0.0598)	0.00658 (0.0573)	0.00658 (0.0573)
Imports							
Δ Log Import Index	0.0891* (0.0506)	0.0891* (0.0506)	0.0221 (0.0351)	0.0153 (0.0359)	0.0153 (0.0359)	0.00912 (0.0316)	0.00912 (0.0316)
Δ Log Import Index, t-1	0.0801 (0.0490)	0.0801 (0.0490)	0.0174 (0.0282)	0.0146 (0.0289)	0.0146 (0.0289)	-0.00205 (0.0253)	-0.00205 (0.0253)
Δ Log Manufactured Goods Index		-0.00186 (0.00125)	0.0133*** (0.00214)	0.00982* (0.00542)	0.00714*** (0.00126)	0.0148*** (0.00556)	0.00774*** (0.00128)
Δ Log Manufactured Goods Index, t-1			0.0625*** (0.0125)	0.0327 (0.0383)	0.00945*** (0.00217)	0.0700* (0.0388)	0.00897*** (0.00204)
Δ Log Exchange Rate			0.495*** (0.0501)	0.499*** (0.0517)	0.499*** (0.0517)	0.470*** (0.0520)	0.470*** (0.0520)
Δ Log M2	0.524*** (0.0912)	0.524*** (0.0912)	0.248*** (0.0582)	0.247*** (0.0591)	0.247*** (0.0591)	0.226*** (0.0571)	0.226*** (0.0571)
Δ Log M2, t-1	0.342*** (0.0568)	0.342*** (0.0568)	0.204*** (0.0331)	0.203*** (0.0336)	0.203*** (0.0336)	0.104*** (0.0222)	0.104*** (0.0222)
GDP Gap				-0.0116 (0.0136)	-0.0116 (0.0136)	0.0008 (0.0139)	0.0008 (0.0139)
Trend					0.000518 (0.000865)		0.00136 (0.000876)
Inflation, t-1						0.175*** (0.0384)	0.175*** (0.0384)
Constant	-0.0677*** (0.0153)	-0.0507*** (0.0137)	-0.445*** (0.0882)	-0.27 (0.237)	-0.127*** (0.0241)	-0.488** (0.239)	-0.113*** (0.0226)
Observations	4040	4040	4040	3847	3847	3812	3812
Number of Countries	141	140	140	139	139	139	139
R-squared	0.757	0.757	0.88	0.883	0.883	0.892	0.892
Country FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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Table 5. Effect of Commodity Price Shocks on Inflation
Local Currency Index

---OLS Estimates, Clustered Standard Errors---

	Dependent Variable: Inflation			
	Low Income	Middle Income	High Income: nonOECD	High Income: OECD
	(1)	(3)	(4)	(5)
Exports				
Δ Log Export Index	-0.486**	-0.670***	-0.0115	-0.515**
	(0.230)	(0.113)	(0.0368)	(0.213)
Δ Log Export Index, t-1	-0.199	0.0613	0.0365	-0.0185
	(0.161)	(0.0786)	(0.0484)	(0.181)
Imports				
Δ Log Import Index	-2.687***	-0.12	-0.0137	1.508*
	(0.882)	(1.384)	(0.0267)	(0.864)
Δ Log Import Index, t-1	-0.477	0.675	0.00288	-0.169
	(0.672)	(0.814)	(0.0201)	(0.568)
Δ Log Manufactured Goods Index	0.0106***	0.0109***	0.00722***	0.00406**
	(0.00282)	(0.00204)	(0.00103)	(0.00191)
Δ Log Manufactured Goods Index, t-1	0.0174***	0.0120***	0.00681***	-0.00427
	(0.00358)	(0.00374)	(0.00214)	(0.00350)
Δ Log Exchange Rate	0.514***	0.505***	0.385***	0.420***
	(0.0602)	(0.0700)	(0.0450)	(0.0719)
Δ Log M2	0.290***	0.328***	0.0536**	0.132***
	(0.0467)	(0.0553)	(0.0241)	(0.0487)
Δ Log M2, t-1	0.141***	0.104***	0.0749***	0.0905***
	(0.0322)	(0.0346)	(0.0185)	(0.0314)
GDP Gap	0.00166	-0.000572	-0.000621	-0.00875
	(0.0188)	(0.0102)	(0.00654)	(0.00569)
Trend	0.00209*	0.00163**	0.000304	0.000182
	(0.00108)	(0.000662)	(0.000490)	(0.000491)
Inflation, t-1	0.0986*	0.128***	0.395***	0.273***
	(0.0523)	(0.0414)	(0.0626)	(0.0667)
Constant	-0.204***	-0.174***	-0.0513*	0.0274
	(0.0505)	(0.0395)	(0.0282)	(0.0353)
Observations	1653	1023	491	616
Number of Countries	62	36	19	21
Country Group	Low Income	Middle Income	High Income: nonOECD	High Income: OECD
R-squared	0.871	0.942	0.915	0.929
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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Table 6. Fiscal Balance Channel of Mediation
Local Currency Index
---OLS Estimates, Clustered Standard Errors---

	Dependent Variable: Inflation	Dependent Variable: Fiscal Balance
	(1)	(2)
Exports		
Δ Log Export Index	-0.566**	11.78***
	(0.266)	(3.171)
Δ Log Export Index, t-1	-0.16	
	(0.115)	
Imports		
Δ Log Import Index	-0.05	
	(0.0374)	
Δ Log Import Index, t-1	0.00474	
	(0.0339)	
Δ Log Manufactured Goods Index	0.0144**	
	(0.00656)	
Δ Log Manufactured Goods Index, t-1	-0.00109	
	(0.00313)	
Δ Fiscal Balance	-0.00201**	
	(0.000815)	
Δ Log Exchange Rate	0.508***	-3.214***
	(0.0388)	(0.570)
Δ Log M2	0.331***	
	(0.0435)	
Δ Log M2, t-1	0.120***	
	(0.0249)	
GDP Gap	-0.00543	
	(0.00689)	
Trend	0.00485*	
	(0.00277)	
Inflation, t-1	0.101**	
	(0.0398)	
Constant	-0.155**	-3.192***
	(0.0778)	(0.563)
Observations	2087	2801
Number of Countries	84	96
R-squared	0.939	0.418
Country FE	YES	YES
Year FE	YES	YES

Robust standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 7. Effect of Commodity Price Shocks on Inflation
Local Currency Index
---OLS Estimates, Clustered Standard Errors---

	Dependent Variable: Inflation	
	Low	High
	(1)	(2)
Exports		
Δ Log Export Index	0.0214	-0.673***
	(0.0280)	(0.129)
Δ Log Export Index, t-1	0.0555	0.0293
	(0.0347)	(0.0878)
Imports		
Δ Log Import Index	0.0183	-0.502
	(0.0168)	(0.612)
Δ Log Import Index, t-1	0.00676	-0.0894
	(0.0176)	(0.469)
Observations	1830	1953
Number of Countries	65	73
Average Inflation Level	Low	High
R-squared	0.586	0.915
Country FE	YES	YES
Year FE	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix

My study looks at the impact of commodity prices changes on the inflation rates of a panel of 140 countries. This Appendix focuses on a single country, Chile, and for this reason is qualitative in nature. This case study will focus on the two driving narratives of Chile's economic history in the last 40 years, "super cycle" in the price of copper and elite capture. Chile has been the exception to the global failure of "neoliberal" economic policies around the world. This exceptionalism was shaped by limited political diversity, protection of the "neoliberal" model from criticism at the cost of equality and individual rights. These policies contributed to Chile's high per capita income growth in the past 40 years. The 2008 financial crisis and the perceived failure of laissez-faire financial reforms in the United States, the cradle of neoliberal policies, shook the public's faith in "free market" capitalism domestically and also globally. This was the impetus for a host of social movements in Chile aimed to challenge the past neoliberal policies.

A.1 Introduction to Chile

Chile is located in South America and stretches along the western coast of the continent from Peru to the southernmost tip of South America. Chile is a mountainous country with large supplies of natural-resources and natural ports on its western coast that enabled its colonization by European settlers. The most abundant natural-resource of Chile are its copper reserves, that are mostly located in the northern Atacama Desert. A second notable resource of Chile is wine that is grown in the Central Valley of Chile, located in the middle of the country.

The capital of the country is Santiago and is located in the Central Valley of Chile. The residents are segregated into wealthy and poor neighborhoods with a glittering downtown featuring many shiny skyscrapers. Chile also ranks highly on many indexes used to measure a country's progress, like per capita GDP and the "ease of doing business". In 2010 Chile became a member of the Organization for Economic Co-operation and Development (OECD). This ascension of a largely developing country into an exclusive club of wealthy countries is odd considering the stark level of inequality and political restriction that still exist in Chile. All these perceived signals of progress are hiding the pervasive inequality in the country. The view from those skyscrapers overlooks poverty, the per capita GDP is driven mostly by the high income elite, and the "ease of doing business" does not look at the welfare of the workers. While the official poverty rate is 15%, it relies on an outdated survey and a recent study by Larrain (2008) finds that the true poverty rate is roughly double the official rate. It is unlikely that the government will update its survey

Copper exports play a huge role in Chile, accounting for half of all exports in 2010. The copper export sector is dominated by international firms which pay royalty and taxes on their earnings. The state copper exporter CODELCO was downsized as part of the neoliberal policy of privatization. This means that majority of the profits from copper exports accrue to foreign firms. The copper export sector does not create any jobs downstream from it, because it is a raw commodity exporter. Most of the supplies for the copper export sector are provided by foreign firms and mostly comprise machinery. The sustainability of this finite natural resource exporting strategy is questionable. For this reason Chile ranks poorly in most indexes that cover Environmental Sustainability.

The modern Chilean political narrative begins with the election of Eduardo Frei Montalva of the "Christian Democrats" in 1964. This centrist candidate started policies to nationalize the mostly United States owned copper companies, agrarian reform and overall progressive social policies. During this time all of South America was under the influence of socialist rhetoric from the Soviet Union and this mobilized the peasants, urban residents , students and labor activists to create the alliance of socialists, Unidad Popular. Their candidate in the 1970 election was Salvador Allende. Upon election Allende embarked on a policy of "Chilean socialism" aimed to nationalize large industry and especially the copper industry. Allende's policy of nationalism and fiscal expansion was financed by seigniorage and resulted in high inflation. These movements were perceived by the United States government and wealthy Chileans as paving the way for a socialist country. With the country embargoed by the United States and dissatisfaction with the new policies high at home, Chile was prime for a coup to swing the pendulum to the other extreme of the political spectrum.

Pinochet was the chief of the armed forces when he overthrew Allende on September 11 1973. Acting on a perceived Soviet threat to Chile , Pinochet enacted a policy of brutal crackdown on any forms of dissent to his rule. Scores of opposition activists were abducted and murdered by the Chilean military and secret police.

To implement economic reform Pinochet turned to the United States and the University of Chicago in particular. 25 Chilean nationals trained at the University of Chicago were recruited into key government positions. They implemented the newly developed neoliberal ideas of macroeconomic discipline, abolition of price controls and deregulating markets and industry. These reforms lowered the inflation rate and increased the GDP growth rate of the economy. Inflation rate went from 340% in 1975 to 9% in 1981. In 1982 Chile had developed large Current Account deficits and experienced a financial crisis. This resulted in a drop in

aggregate consumption and aggregate investment. The 1982 financial crisis and the ensuing recession combined to decrease real wages , increase poverty and unemployment in the country.

The government's reaction was to drop the fixed exchange rate of the Chilean peso versus the US dollar on recommendation from Milton Friedman. This increased the public debt of the country overnight and negatively affected companies that borrowed in US dollars. The overall cost to the Chilean government of the 1982 financial crisis was roughly 40% of the GDP.

For his sins Pinochet was never indicted or jailed. He was placed under house arrest in 1998 on a visit to the United Kingdom. Later Pinochet was extradited back to Chile where was intermittently under house arrest but was not indicted for any crimes during his presidency. Aside from being inconvenienced Pinochet escaped justice and died in 2006 a free man. The decision not to charge Pinochet in Chile for his crimes illustrates the power of Pinochet's powerbase and the complicity of those currently in power in the same crimes.

In the 1988 a referendum was called to decide whether Pinochet could serve another 8 year term as president. Upon Pinochet's defeat Chile was now on a path to democracy. The first freely elected president was Patricio Aylwin from the Christian Democrat party. The transition from military dictatorship to democracy rested on the guarantee that neoliberal economic policy would be sustained and those responsible for the crackdown and repression would not be prosecuted. The new government however did increase the minimum wage, public expenditure on services and infrastructure. Aylwin administration can be described as relatively left leaning.

The following cycle Eduardo Frei Ruiz-Tagle of the Christian Democrats was elected president in 1993. The Frei administration can be described as relatively right leaning. Frei embarked on a policy of privatization of the water sector and further integration of Chile into the world economy. Chile entered the World Trade Organization, Asia-Pacific Economic Cooperation Group, MERCOSUR and signed free trade agreements with Canada and Mexico.

In 2000 a nominally socialist Ricardo Lagos won the presidency. His policies were largely neoliberal, with the exception of public health care reform aimed at lower class people.

In 2006 Lagos was succeeded by Michelle Bachelet of the Socialist Party. Although a socialist who was jailed in the 1970s for her political activism, Bachelet embarked on similar neoliberal economic policy as her predecessors. Her biggest contribution to social welfare in Chile was her reform of the social security system to expand eligibility.

The constitution of Chile was created in 1980 under the military dictatorship and thus restricts the amount of influence the voters have on the legislature and the overall direction of

the country. The practice of appointed senators was nominally eliminated by constitutional reforms in 2005, however the practice exists in practice. This is another example of the long reach of the Pinochet regime on the future of Chile.
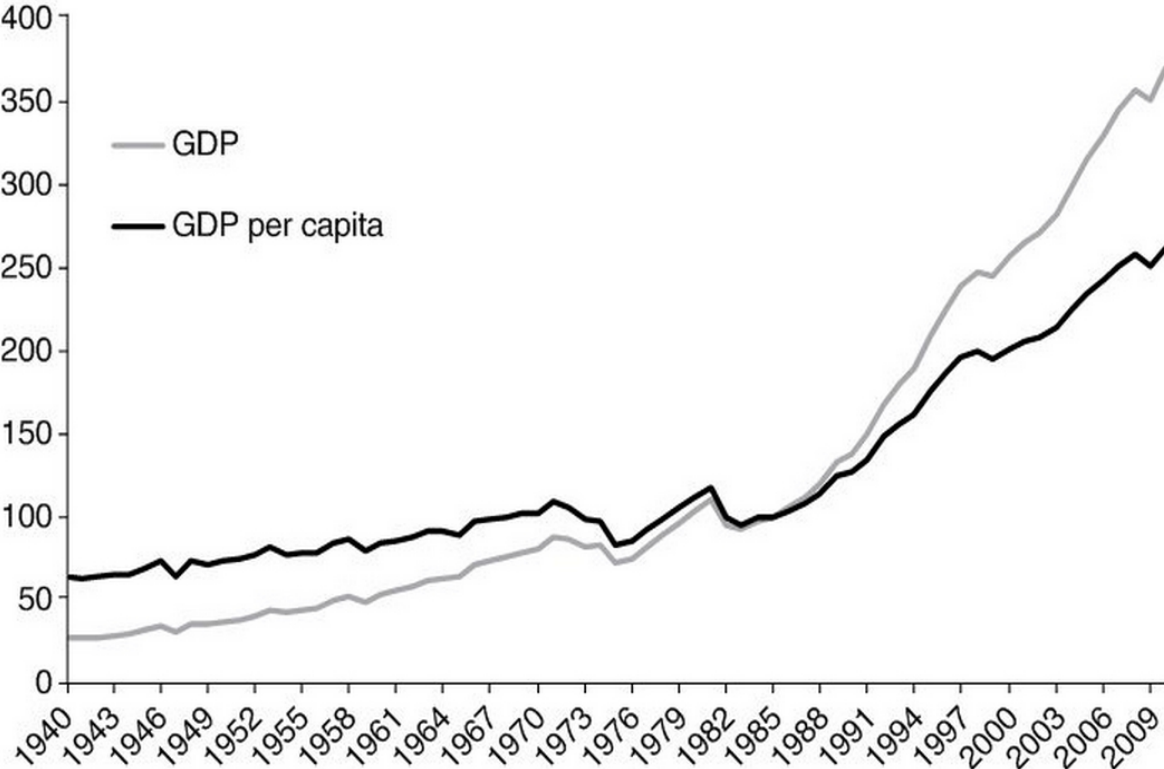
A.2 Macroeconomy of Chile

Figure 4.1 Real GDP level and per capita index, 1985 = 100.

Figure 4.1 from Solimano(2012) shows the GDP and the per capita GDP for Chile. Notable changes in the trend are the coup of 1973, financial crisis of 1982 and the "Chilean miracle" which started in 1985 and resulted in a sharp increase in the GDP growth rate. The high growth rate was interrupted by the Asian Financial crisis of 1997 and more recently by the Global Financial crisis of 2008.

Table 4.1. *Chilean Economic Growth and Enabling Factors: A Comparison between 1940–1985 and 1986–2009*

	1940–1985	1986–2009	1986–1997	1998–2009
Growth Indicators				
Real GDP Growth (% Annual Change)	3.1	5.4	7.6	3.3
Real Per Capita Growth Rate (% Annually)	1.2	4.0	5.8	2.1
Standard Deviation of GDP Growth	6.1	3.2	2.4	2.3
Population Growth (% Annually)	2.0	1.4	1.7	1.1
Gross Fixed Capital Formation (% of GDP)	14.3	21.9	22.8	21.1
Gross National Savings (% of GDP)	16.4	22.2	22.7	21.7
Total Factor Productivity (Index 1960 = 100)	102.8	107.5	102.7	112.9
Exports of Goods and Services (% of GDP)	16.5	33.7	29.8	37.5
Terms of Trade (Jan. 1997 = 100)	125.1	120.8	98.4	143.2
Macroeconomic Indicators				
Fiscal Balance (% of GDP)	−1.3	1.7	1.9	1.5
Inflation Rate (% Annual Change)	38.3	8.9	14.5	3.4
Current Account Balance (% of GDP)	−4.6	−1.4	−3.0	0.2
Real Exchange Rate Index (index 2000 = 100)	147.1	111.3	114.7	108.0
Employment & Labor Indicators				
Unemployment Rate (% Annually)	13.3	8.5	8.1	8.9
Real Wages (Index 2000 = 100)	66.8	92.3	77.5	107.1
Real Wages (% Annual change)	–	2.9	3.6	2.2

Sources: Díaz, Lüders, and Wagner (2007); Central Bank of Chile; DIPRES; and INE. Some data in Column 2 starts in 1960.

Table 4.1 from Solimano(2012) lists the key macroeconomic variables on Chile. Notably the Terms of Trade and inflation variables offer evidence for my main thesis that Export Commodity Price Increases result in a decrease in CPI inflation. For Chile in the 1986-1997 period the Terms of Trade was 98.4 with the inflation rate of 14.5% and in the 1998-2009

period the Terms of Trade was 143.2 with inflation rate of 3.4%. In the case of Chile an increase in the price of copper resulted in a reduction in domestic CPI inflation.

The accelerated growth in GDP of Chile was driven by political stability and an increased integration to global markets through free trade agreements. This sharp increase in per capita GDP did not translate fully into an improvement for the poor. Overall the Chilean Macroeconomy was guided by the "Washington Consensus". Taxes of capital inflows, managed exchange rates and reduction in inflation were practiced ever since the Pinochet regime took power. Near the end of the Pinochet regime the central bank of Chile was established with protections from political pressure and the mandate to maintain low inflation. The managed exchange rate mechanism was dropped for a flexible exchange rate mechanism in 1999. The Concertacion governments of pre 2000s focused mainly on economic growth at the expense of income equality and the environment. The more socialist government from 2000 onward engaged in a policy of Fiscal Surpluses, Bachelet especially set up a fund in 2006 to capture surpluses from copper exports with the aim of engaging in counter cyclical fiscal spending. This fund was used by Bachelet to fund public welfare spending, like assistance to middle income house buyers. Following Table 4.5 From Solimano (2012) shows the different changes in Fiscal and Monetary policy of Chile.

Table 4.5. *Chile: Main Macroeconomic Policies, 1990–2009*

	Aylwin Administration (1990–1994)	Frei Administration (1994–1999)	Lagos Administration (2000–2005)	Bachelet Administration (2006–2009)
Fiscal Policy	Austere (without fiscal rule)	Moderately austere (without fiscal rule)	Rule of structural fiscal surplus: 1% of GDP	Rule of structural fiscal surplus: 0.5% of GDP (from 2007)
Exchange Rate Policy	Exchange rate band	Exchange rate band	Floating	Floating
Monetary Policy	Eclectic	Eclectic	Inflation targeting	Inflation targeting
Taxes to Short-Term Capital Flows	Yes	Yes	No	No

Sources: Author's elaboration and Solimano and Pollack (2006).

Chile adopted a policy of non-intervention in the exchange rates and thus has experienced higher variation in the nominal exchange rates in the 2000-2009 period. This increased volatility in exchange rates , not focusing on unemployment are some of the drawbacks of the Chilean approach to monetary policy with the sole goal of inflation targeting.

A.3 Inequality and Poverty

The Gini coefficient for Chile has been above 50 and constant through the last 20 years. Transition back to democracy, increases in GDP and per capita GDP did not affect the Gini coefficient and the underlying inequality in Chile. The constitution crafted under Pinochet and general low levels of empowerment reduce the amount of influence ordinary people have on public policy. This results in a lack of social services like public pensions, healthcare and good schooling.

Transition back to democracy and the election of nominal socialist leaders did not result in any effects to implement redistribution. The topic of wealth redistribution may still be contentious in Chile and thus the successive governments decided instead to focus on poverty reduction, instead of tackling the underlying causes of inequality.

Table 5.1. *Chile: Official Poverty Shows a Drastic Decline, 1987–2009*

Year	Poverty Rate (%)	Acute Poverty Rate (%)
1987	45.1	17.4
1990	38.6	12.9
1992	32.6	8.8
1994	27.5	7.6
1996	23.2	5.7
1998	21.7	5.6
2000	20.6	5.7
2003	18.8	4.7
2006	13.7	3.2
2009	15.1	3.7

Source: CASEN surveys (1987–2009).

Table 5.1 from Solimano (2012) shows the reduction in poverty and acute poverty in Chile. The recent economic prosperity and social programs targeted at the poor were successful in lowering the overall and the acute rates of poverty. These numbers are uplifting, however the methodology for calculating the official poverty rate was questioned by Larrain (2008). Additionally getting out of poverty is not permanent for all households in Chile. Lopez (2008) showed that a large part of the population is only slightly above the poverty line and any large exogenous shock can drive those households back into poverty. Chile is known for earthquakes that can wreak large scale damage even in the most adapted cities. The lack of a robust social net will mean that a large share of the population could fall into poverty in the case of a large earthquake.

The top 10% of Chile's population captured 40% of its income in 2009, while the bottom 20% captured only 3.6% of the total income. For this reason Chile ranks very high in the Gini coefficient among its South American neighbors. Acemoglu (2012) illustrated how an elite capture of a country will result in lower institutional quality and then to a reduction in the country GDP and other measurements of prosperity. The case of Chile however provides anecdotal evidence of the opposite. High and persistent inequality, combined with a large

reduction in institutional quality stemming from the Pinochet coup and repression should have resulted in a basketcase country. In the case of Chile both of those thing did not stop the country from growing and eventually joining OECD. It is possible that elite capture of resources and the deterioration in institutional quality happens over many decades and the past 20 years of democracy in Chile is not a long enough time horizon to see any significant effects. The problem of inequality is compounded by a very regressive tax system that heavily favors the rich over the poor and middle income citizens. The following Table 4 from Lopez(2007) provides an overview of the skewed tax system that provides 81% of tax loopholes to the top 5% of the income distribution.

Table 4: Distribution of Forgone Personal Income Taxes for highest 5 percentiles of Income 2004

	Subtotal* Millions US$	P96	P97	P98	P99	P100	Subtotal**
Special Regimes[a]	58	0.4%	0.7%	1.3%	3.2%	38.0%	43.6%
Exemptions[b]	33	0.9%	1.4%	1.7%	3.3%	78.6%	85.9%
Deductions[c]	140	6.4%	7.3%	10.6%	18.5%	27.6%	70.4%
Tax credits[d]	121	1.6%	2.1%	3.6%	5.5%	57.4%	70.2%
Tax deferments[e]	1426	3.2%	3.4%	4.7%	7.9%	66.6%	85.8%
Total	1777	3.2%	3.5%	4.9%	8.3%	60.8%	80.7%

Source: SII, Sub direction of Studies, March 2006
Notes: Although it refers to personal income it includes forgone corporate taxes. In Chile corporate taxes count as credits for personal income taxes.
* Only tax forgone for highest 5 percentiles of income
** As a % total tax personal income forgone
[a] This includes special regimes for small agriculture, mining, transportation and fishing industries.
[b] Activities exempted from certain taxes such as free trade zones or special areas and educational institutions.
[c] Donations to education and sport and political institutions.
[d] Credits for donations, setting up in special zones and special treatment to agriculture land and fixed assets.
[e] Deferments due to accelerated depreciation, retained profits and private pension savings plans.

The social compact in Chile promised high economic growth and targeted social programs for the poor in exchange for persistent high inequality. Pre 1970s the aim of economic development in Chile was social modernization and general industrialization. To achieve this aim public education, urban housing and public health infrastructure were emphasized. After the Pinochet coup the development goals of Chile were changed to closely follow the Washington Consensus. The goal of development was shifted from reducing inequality to reducing poverty. Privatization in all aspects of economic life was mandated.

Lagos and her successor Bachelet set out to change the goal of economic development in Chile by focusing on increasing social protection. The first aspect was reform of the anti poverty program Chile Solidario. This program provided cash assistance to some 300,000 families and also worked with those families to meet certain conditions over a two year period.

The education law implemented by the Pinochet regime was called Ley Organica Constitucional de Educacion (LOCE). The aim of that law was to privatize the educational system in Chile as much as possible. This resulted in a two tiered system with underfunded public schools for the poor and middle income people and a private school system for the wealthy. This resulted in university students being responsible for upto 80% of their tuition and fees. Student unions like Federacion de Estudiantes de Chile and Federacion de Estudiantes de la Pontificia Universidad Catolica de Chile protested this segregated system of education. Such a tiered system helps maintain the high inequality in Chile by denying poor and middle income students the opportunity for upward mobility through educational achievement. Efforts to reform this system were met with pushback from neoliberal forces in Chile, as the voucher system used in LOCE was the brain child of Milton Friedman. This voucher system split the educational system into three parts. Public schools, voucher subsidized schools and fully private schools.

Following massive student strikes in 2006 and 2011 president Bachelet introduced new laws governing education in Chile. Her reforms did not address the core stratification of the education system, but merely provided larger educational subsidies for low income and middle income households. The new subsidy covers preschool and primary school fees.

The Pinochet regime introduced privatization into the healthcare sector by dividing it into public and private parts. The public part, FONASA, insured access to healthcare for all. The poor people do not pay for their treatment in FONASA facilities. FONASA system is characterized by long waiting lines and under funded facilities. The private part is called ISAPRES and the fees for treatment are calculated based on the recipient's income. Healthcare sector underwent reform under the socialist governments of Lagos and Bachelet. The goal of this reform , titled AUGE, was to increase preventative treatment and increase access to treatment for lower and middle income Chileans. The military in Chile has its own health care service.

Another important social net that was destroyed by the Pinochet regime was the Chilean Pension system. The pension system was privatized with reliance on voluntary contributions as the main source of funding for each person's retirement. This arrangement

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favored people in high paying white collar jobs over the majority of Chileans employed in small and medium businesses. The individual has to make at least 20 years of contributions to receive a minimum pension under this system. The privatized retirement system did contribute to the development of financial markets in Chile. Bachelet introduced reform that gave persons age 65 and over supplementary pension if they met certain criteria. This was done to help the poor people that do not receive a pension. Once again the military is exempt from the private pension system.

Since the restoration of Democracy , the military has enjoyed a privileged status in Chile. The command in chief of the Chilean army is not accountable to the civilian oversight. The military used to receive a set 10% of the revenues from the state owned copper company, CODELCO. This arrangement ended in 2009. Now the military is budgeted a nominal sum. This was done at the request of the military, because it wanted a stable source of revenue for its funding.

The Chilean experience of political instability is common in South America. Argentina has experienced repeated cycles of political turmoil from 1960 all the way up to 1990. Ecuador has experienced instability from 1960 to 1980. The Dominican Republic has experienced instability in the 1960s.

Chile ranks high in common measurements of good governance as defined by the World Bank. On the measurements of Voice and Accountability, Political Stability, Government Effectiveness, Regulatory Quality, Rule of Law and Control of Corruption Chile ranks much higher than its South American neighbors. For this reason Foreign Direct Investment has been an important part of copper mining sector's development in Chile. More recently FDI has flown into a variety of South American countries. Most of that investment has been into petroleum, natural gas and mineral production. In Chile Chinese FDI has been directed solely at the copper mining center.(Barton, 2009) Neoliberal reforms guaranteed private property rights and made Chile a relatively safer place for FDI than Bolivia, Ecuador and Venezuela. (Hogenboom, 2010; Kirby, 2010)

Dézalay and Garth (2002) found that the "technocrat' class in Chile played a key role in the democratization process. This "technocrat" class is made up of the elite with high academic and professional achievement. According to Silva (1991, 2008) the "technocrat" class maintains strong influence on the public through Think Tanks. For this reason the stratified educational system and non-elected senators are the main mechanisms that the elites in Chile have to maintain their position.

Chile has very low rate of investment into Research and Development. On average Chile spends about 0.5% of its GDP on R&D while other countries like Korea spend 2.6%, and Ireland spends 2.6%. The private sector in Chile does not contribute enough to Research and Development compared to other countries. In Sweden the private sector contributed 70% of all R&D, while in Chile the figure is only 26%. (Gregorio, 2005)
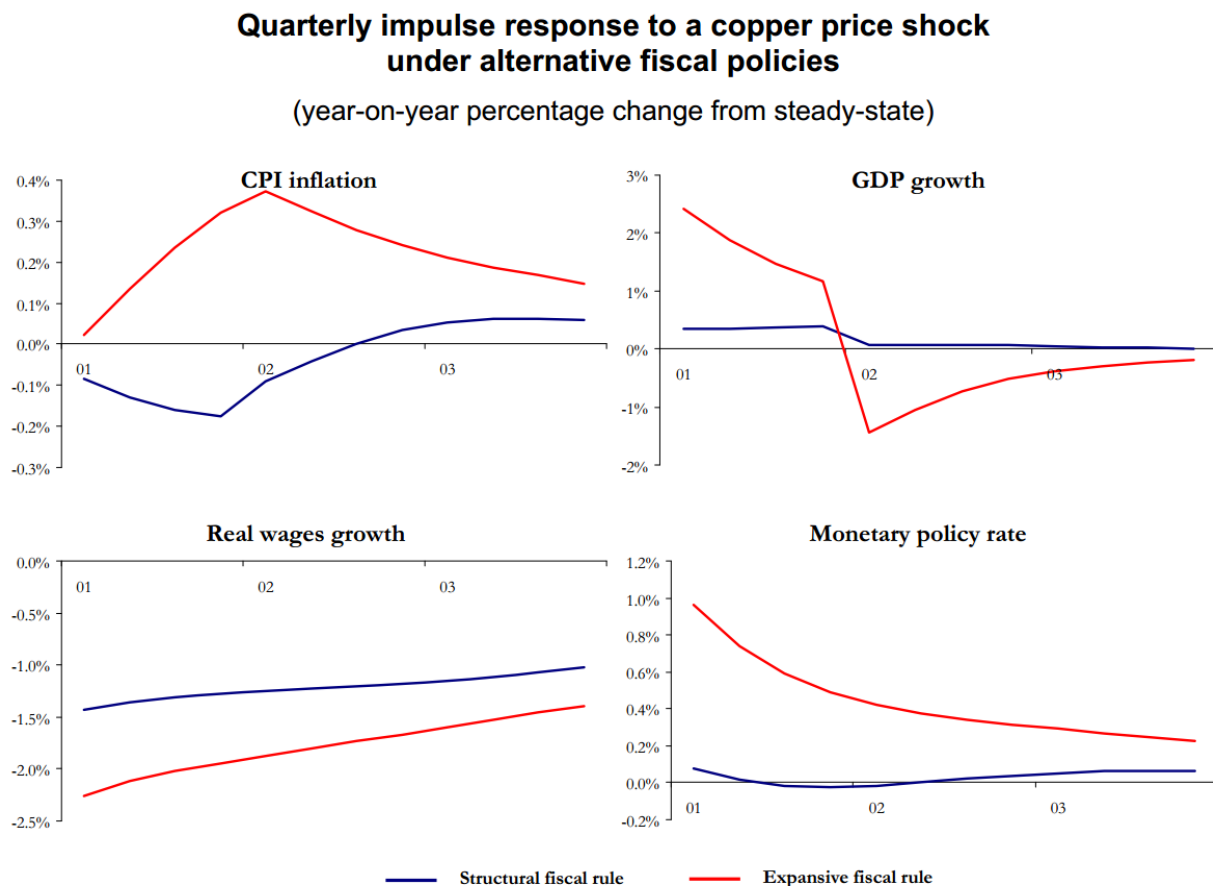
A.4 Copper Exports and Inflation in Chile

The main findings of my paper are confirmed in the case of Chile. An increase in the price of copper leads to a decrease in inflation. The following figure from Desormeaux(2009) shows that positive terms of trade shocks in Chile are negatively correlated with the inflation rate.

GDP and consumption deflators, and terms of trade

(year-on-year percentage change)
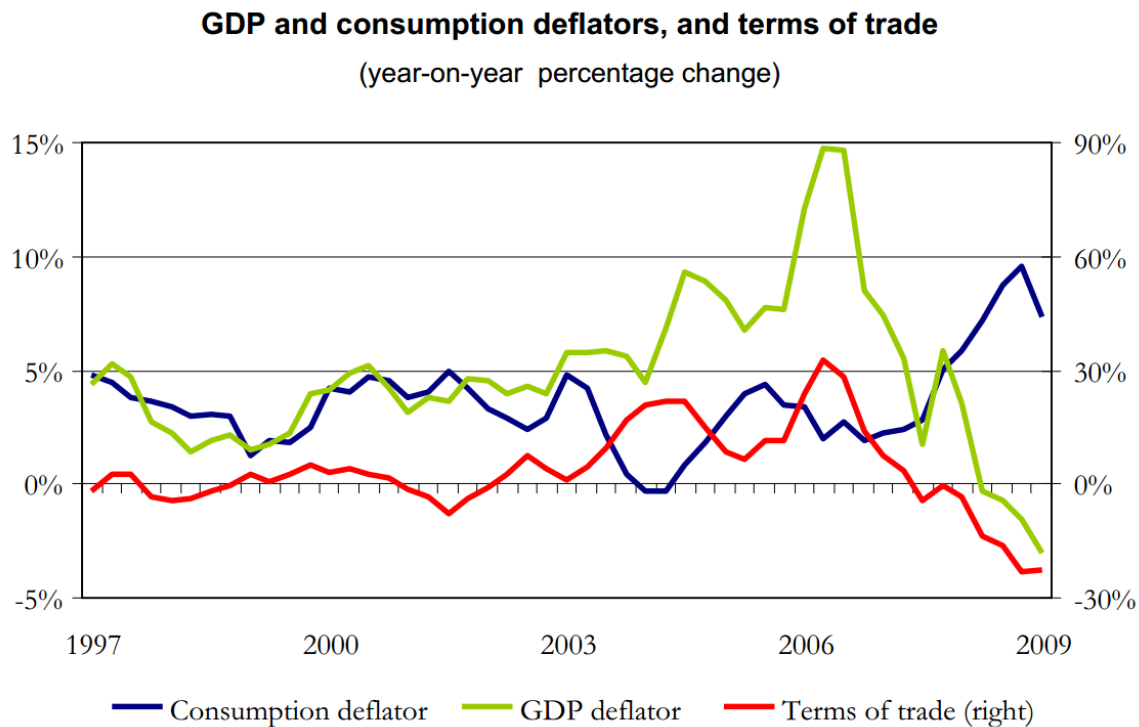
My analysis looks at the impact of raw commodity exports. Terms of trade is calculated by looking the price of exported goods as a ratio of imported goods. In the case of Chile, copper represents 50% of the exported goods, thus the terms of trade closely resembles my analysis of the Commodity Price Index. From the previous figure one can see that the rise in copper prices from 2003 to 2005 resulted in a reduction of the inflation rate from 5% to 0%. While a reduction in the price of copper from 2006 to 2009 resulted in an increase in CPI inflation during the same period.

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Desormeaux(2009) models both pro-cyclical and counter-cyclical fiscal policy. The following findings from Desormeaux(2009) suggest that Chile is engaged in counter-cyclical fiscal policy.

Quarterly impulse response to a copper price shock under alternative fiscal policies

(year-on-year percentage change from steady-state)

A.4 Conclusion

Chile is an example of a middle income trap, where a country develops rapidly using commodity exports and then fails to transition to a fully developed economy. There are pockets of promise such as Chile's integration into the global economy, well developed financial markets at home and good governance as measured by the World Bank. However to successfully transition from a largely resource driven economy to a modern developed economy several crucial changes must be made to areas of inequality, education and political inclusion. The biggest hindrance to this process is the stratified educational system. The stranglehold of the neoliberal elite on the economy and political discussion in Chile hinders any significant change in course. The fundamentalist neoliberal policies and the fear of straying from their prescribed path stifles discourse on important issues of social safety nets, equality of opportunity and public infrastructure investment. Heavy reliance on a single raw commodity

exporting industry does not foster job growth or technological transfer to other sectors of the economy. Learning to dig holes in the ground does not spur development of a manufacturing sector. Neoliberal fundamentalism also prohibits public investment into needed infrastructure, both physical and educational.