

MACROECONOMIC EFFECTS OF CONFLICT: Notes for the Macroeconomic Presentation¹

By

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Appendix 1:

Slides 11-13 Barandiaran

A paper that has tried to go into detail into determining the cost of the conflict in Mindanao is that of Barandiaran.

1. War (1970-1982) caused Mindanao GDP growth to be 1% lower than it would otherwise have been.

2. When there was no outright war but tensions were high (1997-2002), Mindanao growth was lower by half a percentage point than it would otherwise have been.

3. For the Philippines as a whole this would amount to about a fifth of a percentage point lower growth.

Should the conflict continue for another 10 years, then according to Barandiaran, the cost the Philippine economy is about \$2 billion a year.

4. Mindanao will suffer as its per capita GDP will be 10% less than it otherwise would have been.

5. While these figures may appear high, they actually still pale in comparison with estimated loss in other countries.

For example, in Sierra Leone the estimated GDP growth loss is 3.45%, in Nicaragua 5.11%, in Liberia 4.18%. In Iraq the estimated loss is 16% (Iran-Iraq war).

6. According to Barandiaran, the Philippines losses are relatively because the conflict is contained within a small area. And also the economic base of Southwestern Mindanao, where the conflict, is small to begin with.

Slides 9-16 PHDR tables

7. Muslim Mindanao provinces generally lag in human development. To a lesser extent, and for some measures, several of the CAR provinces also lag.

8. The Muslim Mindanao provinces are also those identified as least likely to achieve MDG goals.

ARMM and CAR provinces lag in life expectancy. ARMM in education measures and real per capita income, poverty incidence, and overall HDI. (Apayao also in its graduate ratio). ARMM and CAR provinces lag in the human poverty index.

Slides 17-22 MDG maps

9. Poverty incidence high in Muslim areas.

10. Cohort survival rate low and infant mortality rate high in Muslim areas and areas with high concentration of indigenous people.

Slides 23-24 Robust relationship

11. Negative relationship between various development measures and Mindanao conflict quite robust

12. Even if you control for geographic variables (*climate, topography, etc.*) and access and infrastructure variables (*road density, presence of port, etc.*) a dummy variable for conflict regions in Mindanao still has strong explanatory power (Monsod et al.)

Controlling for all these other variables, on average, in Muslim Mindanao

- *poverty incidence* is 32 percentage points higher
- *per capita income* P11,000 lower (2000 value)
- *cohort survival rate* 31 percentage points lower
- *infant mortality rate* 15 points higher

Dynasty variable significant

- *cohort survival rate* 10 percentage points lower

Appendix 2:

Note on regression:

Causation from conflict to human development outcomes is difficult to prove given the limitations of data. At most what can be shown is strong lingering correlation after controlling for as many other factors as possible (or reasonable) that might also influence human development outcomes.

Below are regressions of a) poverty incidence, b) per capita income, c) cohort survival rate, and d) infant mortality rate against *geographic variables* such as climate and frequency of typhoons, *market access variables* such as road density, presence of commercial ports, proximity to commercial center, etc, a *political variable* dynasty, a proxy for initial conditions *poverty incidence in 1991*, a dummy for Muslim Mindanao (set 1) and dummy variables for Muslim Mindanao and Cordillera Region (set 2). In addition, set 3 shows the same regressions this time with all the regional dummies (except for region 1 which is the control region) and set 4 shows the same regressions with the regional dummy for Cordillera Region only. Variable descriptions are found after the regression tables.

What the results show is that there is a strong lingering negative correlation between all these human development indicators and Muslim Mindanao even while controlling for all the other factors. On the other hand, infant mortality in a CAR province is also significantly higher than the average province (other than those in Muslim Mindanao region), holding all other variables constant (as shown in Set 2).

In Set 3, it should be noted that if one is attempting to determine causality or correlation with respect to 'primitive' causes such as geography, infrastructure, or political economy variables, adding more regional dummies might only dissipate the relationship with these variables.

SET 1: Muslim Mindanao Regional Dummy only

1. Regression of **Poverty Incidence** against dummy for Muslim Mindanao and control variables

Regression with robust standard errors

Number of obs = 72
 F(13, 58) = 12.03
 Prob > F = 0.0000
 R-squared = 0.7131
 Root MSE = 10.229

| | Coef. | Robust Std. Err. | t | P> t | [95% Conf. Interval] | |
|----------|-----------|------------------|-------|-------|----------------------|-----------|
| bpov00 | | | | | | |
| bpov91 | .3728079 | .0721864 | 5.16 | 0.000 | .2283113 | .5173046 |
| clim2 | 7.146436 | 4.349132 | 1.64 | 0.106 | -1.559298 | 15.85217 |
| clim3 | 9.082091 | 3.346882 | 2.71 | 0.009 | 2.382579 | 15.7816 |
| clim4 | 8.330681 | 4.24519 | 1.96 | 0.055 | -.1669898 | 16.82835 |
| ftyphoon | 4.69004 | 3.090904 | 1.52 | 0.135 | -1.497076 | 10.87716 |
| popden90 | .0058724 | .008547 | 0.69 | 0.495 | -.0112362 | .022981 |
| propinld | -.1806221 | .0473678 | -3.81 | 0.000 | -.2754392 | -.0858051 |
| popcap | -8.419971 | 6.417793 | -1.31 | 0.195 | -21.26658 | 4.426638 |
| intlport | .2203281 | 3.19403 | 0.07 | 0.945 | -6.173218 | 6.613874 |
| ports | -.1132377 | .1013626 | -1.12 | 0.269 | -.3161371 | .0896616 |
| rdens90 | -7.544828 | 6.223032 | -1.21 | 0.230 | -20.00158 | 4.911925 |
| dyna | 4.508759 | 7.332195 | 0.61 | 0.541 | -10.16822 | 19.18574 |
| muslmin | 32.01403 | 9.303295 | 3.44 | 0.001 | 13.39146 | 50.6366 |
| _cons | 21.99054 | 5.253426 | 4.19 | 0.000 | 11.47466 | 32.50641 |

2. Regression of **Per Capita Income** against dummy for Muslim Mindanao and control variables

Regression with robust standard errors

Number of obs = 72
 F(13, 58) = 6.19
 Prob > F = 0.0000
 R-squared = 0.5999
 Root MSE = 4173.6

| | Coef. | Robust Std. Err. | t | P> t | [95% Conf. Interval] | |
|----------|-----------|------------------|-------|-------|----------------------|-----------|
| pcinc | | | | | | |
| bpov91 | -111.4717 | 30.50185 | -3.65 | 0.001 | -172.5278 | -50.41567 |
| clim2 | -2817.322 | 1975.597 | -1.43 | 0.159 | -6771.91 | 1137.265 |
| clim3 | -2063.141 | 1683.655 | -1.23 | 0.225 | -5433.343 | 1307.062 |
| clim4 | -1382.322 | 1731.926 | -0.80 | 0.428 | -4849.149 | 2084.504 |
| ftyphoon | -1527.105 | 1290.033 | -1.18 | 0.241 | -4109.386 | 1055.177 |
| popden90 | 1.253741 | 3.816383 | 0.33 | 0.744 | -6.38558 | 8.893061 |
| propinld | 49.75272 | 19.64795 | 2.53 | 0.014 | 10.42306 | 89.08237 |
| popcap | 1903.086 | 2412.81 | 0.79 | 0.433 | -2926.677 | 6732.849 |
| intlport | -1505.244 | 2206.701 | -0.68 | 0.498 | -5922.435 | 2911.947 |
| ports | 35.27432 | 54.96787 | 0.64 | 0.524 | -74.75583 | 145.3045 |
| rdens90 | 4064.88 | 1944.484 | 2.09 | 0.041 | 172.5733 | 7957.187 |
| dyna | -2420.37 | 2196.479 | -1.10 | 0.275 | -6817.101 | 1976.361 |
| muslmin | -11063.1 | 2598.655 | -4.26 | 0.000 | -16264.88 | -5861.329 |
| _cons | 25779.9 | 2650.733 | 9.73 | 0.000 | 20473.88 | 31085.92 |

3. Regression of **Cohort Survival Rate** against dummy for Muslim Mindanao and control variables

Regression with robust standard errors

Number of obs = 72
 F(13, 58) = 19.19
 Prob > F = 0.0000
 R-squared = 0.7721
 Root MSE = 7.6869

| cohor99 | Coef. | Robust Std. Err. | t | P> t | [95% Conf. Interval] | |
|----------|-----------|------------------|-------|-------|----------------------|-----------|
| bpov91 | -.1607015 | .0535689 | -3.00 | 0.004 | -.2679312 | -.0534717 |
| clim2 | -4.773452 | 4.009073 | -1.19 | 0.239 | -12.79848 | 3.25158 |
| clim3 | -4.588207 | 2.494438 | -1.84 | 0.071 | -9.581367 | .4049534 |
| clim4 | -.6432546 | 3.242355 | -0.20 | 0.843 | -7.133534 | 5.847025 |
| ftyphoon | 5.708408 | 2.294069 | 2.49 | 0.016 | 1.11633 | 10.30049 |
| popden90 | .0099855 | .0066393 | 1.50 | 0.138 | -.0033044 | .0232755 |
| propinld | -.0539927 | .0358309 | -1.51 | 0.137 | -.1257162 | .0177307 |
| popcap | 8.321787 | 4.025022 | 2.07 | 0.043 | .2648315 | 16.37874 |
| intlport | 1.667119 | 4.356859 | 0.38 | 0.703 | -7.054081 | 10.38832 |
| ports | -.1429316 | .0909558 | -1.57 | 0.122 | -.3249995 | .0391363 |
| rdens90 | 16.01495 | 4.302011 | 3.72 | 0.000 | 7.40354 | 24.62636 |
| dyna | -10.64016 | 5.171469 | -2.06 | 0.044 | -20.99198 | -.2883396 |
| muslmin | -31.41775 | 5.91026 | -5.32 | 0.000 | -43.24842 | -19.58708 |
| _cons | 61.43787 | 5.705131 | 10.77 | 0.000 | 50.01781 | 72.85793 |

4. Regression of **Infant Mortality Rate** against dummy for Muslim Mindanao provinces and control variables

Regression with robust standard errors

Number of obs = 72
 F(13, 58) = 31.45
 Prob > F = 0.0000
 R-squared = 0.7512
 Root MSE = 4.0341

| infm95 | Coef. | Robust Std. Err. | t | P> t | [95% Conf. Interval] | |
|----------|-----------|------------------|-------|-------|----------------------|-----------|
| bpov91 | .0490101 | .0275013 | 1.78 | 0.080 | -.0060398 | .10406 |
| clim2 | 6.584904 | 2.151621 | 3.06 | 0.003 | 2.277968 | 10.89184 |
| clim3 | 4.406733 | 1.761777 | 2.50 | 0.015 | .8801537 | 7.933312 |
| clim4 | 3.752683 | 2.278178 | 1.65 | 0.105 | -.8075854 | 8.312952 |
| ftyphoon | 1.638976 | 1.20024 | 1.37 | 0.177 | -.7635659 | 4.041519 |
| popden90 | -.0128709 | .0037664 | -3.42 | 0.001 | -.0204102 | -.0053317 |
| propinld | -.0320726 | .0168879 | -1.90 | 0.063 | -.0658775 | .0017323 |
| popcap | -.5300988 | 2.35546 | -0.23 | 0.823 | -5.245065 | 4.184867 |
| intlport | -1.62146 | 1.947031 | -0.83 | 0.408 | -5.518865 | 2.275946 |
| ports | -.0964938 | .0542374 | -1.78 | 0.080 | -.2050616 | .0120741 |
| rdens90 | -3.090837 | 1.855899 | -1.67 | 0.101 | -6.805821 | .624148 |
| dyna | -1.23459 | 2.085097 | -0.59 | 0.556 | -5.408365 | 2.939186 |
| muslmin | 14.94923 | 1.864662 | 8.02 | 0.000 | 11.2167 | 18.68176 |
| _cons | 55.84655 | 2.798657 | 19.95 | 0.000 | 50.24443 | 61.44867 |

SET 2: Muslim Mindanao and Cordillera Regional Dummies only

1. Regression of **Poverty Incidence** against dummy for Muslim Mindanao and Cordillera Region and control variables

Regression with robust standard errors

Number of obs = 72
 F(14, 57) = 11.41
 Prob > F = 0.0000
 R-squared = 0.7132
 Root MSE = 10.317

| bpov00 | Coef. | Robust Std. Err. | t | P> t | [95% Conf. Interval] | |
|----------|-----------|------------------|-------|-------|----------------------|-----------|
| bpov91 | .3709213 | .0733028 | 5.06 | 0.000 | .224135 | .5177076 |
| clim2 | 7.217978 | 4.496355 | 1.61 | 0.114 | -1.785818 | 16.22177 |
| clim3 | 9.128709 | 3.439488 | 2.65 | 0.010 | 2.241253 | 16.01617 |
| clim4 | 8.393714 | 4.418567 | 1.90 | 0.063 | -.4543135 | 17.24174 |
| ftyphoon | 4.599115 | 3.091288 | 1.49 | 0.142 | -1.591082 | 10.78931 |
| popden90 | .0062046 | .0090088 | 0.69 | 0.494 | -.0118353 | .0242444 |
| propinld | -.1825645 | .0493167 | -3.70 | 0.000 | -.2813195 | -.0838095 |
| popcap | -8.612252 | 6.650239 | -1.30 | 0.201 | -21.92913 | 4.704621 |
| intlport | .0980555 | 3.251403 | 0.03 | 0.976 | -6.412766 | 6.608877 |
| ports | -.1146927 | .1020584 | -1.12 | 0.266 | -.3190611 | .0896756 |
| rdens90 | -7.509627 | 6.311066 | -1.19 | 0.239 | -20.14732 | 5.128064 |
| dyna | 4.58094 | 7.429012 | 0.62 | 0.540 | -10.2954 | 19.45728 |
| muslmin | 31.94459 | 9.353528 | 3.42 | 0.001 | 13.21447 | 50.6747 |
| regcar | .8747413 | 4.440656 | 0.20 | 0.845 | -8.017519 | 9.767001 |
| _cons | 22.11637 | 5.172656 | 4.28 | 0.000 | 11.7583 | 32.47443 |

2. Regression of **Per Capita Income** against dummy for Muslim Mindanao and Cordillera Region and control variables

Regression with robust standard errors

Number of obs = 72
 F(14, 57) = 7.19
 Prob > F = 0.0000
 R-squared = 0.6132
 Root MSE = 4139.3

| pcinc | Coef. | Robust Std. Err. | t | P> t | [95% Conf. Interval] | |
|----------|-----------|------------------|-------|-------|----------------------|-----------|
| bpov91 | -118.7675 | 29.94015 | -3.97 | 0.000 | -178.7217 | -58.81344 |
| clim2 | -2540.661 | 1996.038 | -1.27 | 0.208 | -6537.658 | 1456.337 |
| clim3 | -1882.863 | 1635.457 | -1.15 | 0.254 | -5157.809 | 1392.084 |
| clim4 | -1138.567 | 1738.276 | -0.65 | 0.515 | -4619.405 | 2342.272 |
| ftyphoon | -1878.723 | 1238.626 | -1.52 | 0.135 | -4359.03 | 601.5828 |
| popden90 | 2.538191 | 3.998953 | 0.63 | 0.528 | -5.469574 | 10.54596 |
| propinld | 42.24123 | 20.37696 | 2.07 | 0.043 | 1.437076 | 83.04539 |
| popcap | 1159.506 | 2506.022 | 0.46 | 0.645 | -3858.716 | 6177.728 |
| intlport | -1978.089 | 2074.718 | -0.95 | 0.344 | -6132.641 | 2176.462 |
| ports | 29.64764 | 56.07149 | 0.53 | 0.599 | -82.63358 | 141.9289 |
| rdens90 | 4201.006 | 1918.005 | 2.19 | 0.033 | 360.2663 | 8041.745 |
| dyna | -2141.234 | 2195.731 | -0.98 | 0.334 | -6538.109 | 2255.641 |
| muslmin | -11331.65 | 2673.912 | -4.24 | 0.000 | -16686.07 | -5977.235 |
| regcar | 3382.746 | 1914.611 | 1.77 | 0.083 | -451.1956 | 7216.688 |
| _cons | 26266.49 | 2603.205 | 10.09 | 0.000 | 21053.66 | 31479.32 |

3. Regression of **Cohort Survival Rate** against dummy for Muslim Mindanao and Cordillera Region and control variables

Regression with robust standard errors

Number of obs = 72
 F(14, 57) = 18.26
 Prob > F = 0.0000
 R-squared = 0.7730
 Root MSE = 7.7397

| cohor99 | Coef. | Robust Std. Err. | t | P> t | [95% Conf. Interval] | |
|----------|-----------|------------------|-------|-------|----------------------|-----------|
| bpov91 | -.1562199 | .0553659 | -2.82 | 0.007 | -.2670881 | -.0453516 |
| clim2 | -4.943397 | 4.123184 | -1.20 | 0.236 | -13.19993 | 3.313136 |
| clim3 | -4.698946 | 2.497754 | -1.88 | 0.065 | -9.700612 | .302719 |
| clim4 | -.7929865 | 3.317954 | -0.24 | 0.812 | -7.437074 | 5.851101 |
| ftyphoon | 5.924397 | 2.362348 | 2.51 | 0.015 | 1.193878 | 10.65492 |
| popden90 | .0091965 | .0069336 | 1.33 | 0.190 | -.0046878 | .0230808 |
| propinld | -.0493787 | .037402 | -1.32 | 0.192 | -.124275 | .0255176 |
| popcap | 8.778547 | 4.038385 | 2.17 | 0.034 | .6918202 | 16.86527 |
| intlport | 1.957574 | 4.486865 | 0.44 | 0.664 | -7.027218 | 10.94237 |
| ports | -.1394753 | .0904414 | -1.54 | 0.129 | -.3205811 | .0416305 |
| rdens90 | 15.93133 | 4.411192 | 3.61 | 0.001 | 7.098074 | 24.76459 |
| dyna | -10.81162 | 5.286209 | -2.05 | 0.045 | -21.39707 | -.2261731 |
| muslmin | -31.25279 | 6.08883 | -5.13 | 0.000 | -43.44546 | -19.06012 |
| regcar | -2.07792 | 3.198751 | -0.65 | 0.519 | -8.483308 | 4.327468 |
| _cons | 61.13897 | 5.689866 | 10.75 | 0.000 | 49.74521 | 72.53273 |

4. Regression of **Infant Mortality Rate** against dummy for Muslim Mindanao and Cordillera Region and control variables

Regression with robust standard errors

Number of obs = 72
 F(14, 57) = 36.01
 Prob > F = 0.0000
 R-squared = 0.7716
 Root MSE = 3.8995

| infm95 | Coef. | Robust Std. Err. | t | P> t | [95% Conf. Interval] | |
|----------|-----------|------------------|-------|-------|----------------------|-----------|
| bpov91 | .0379635 | .0243512 | 1.56 | 0.125 | -.0107989 | .0867258 |
| clim2 | 7.003799 | 2.144912 | 3.27 | 0.002 | 2.708688 | 11.29891 |
| clim3 | 4.679692 | 1.633971 | 2.86 | 0.006 | 1.407721 | 7.951664 |
| clim4 | 4.121755 | 2.218443 | 1.86 | 0.068 | -.3206003 | 8.564109 |
| ftyphoon | 1.106589 | 1.209255 | 0.92 | 0.364 | -1.314902 | 3.528079 |
| popden90 | -.0109261 | .0036867 | -2.96 | 0.004 | -.0183087 | -.0035436 |
| propinld | -.0434458 | .0178087 | -2.44 | 0.018 | -.0791072 | -.0077844 |
| popcap | -1.655956 | 2.509965 | -0.66 | 0.512 | -6.682075 | 3.370162 |
| intlport | -2.337397 | 1.698703 | -1.38 | 0.174 | -5.738991 | 1.064198 |
| ports | -.1050132 | .0537394 | -1.95 | 0.056 | -.2126245 | .0025982 |
| rdens90 | -2.884729 | 1.80589 | -1.60 | 0.116 | -6.500961 | .7315035 |
| dyna | -.8119491 | 1.977877 | -0.41 | 0.683 | -4.772579 | 3.148681 |
| muslmin | 14.54262 | 1.596556 | 9.11 | 0.000 | 11.34557 | 17.73967 |
| regcar | 5.121829 | 2.036474 | 2.52 | 0.015 | 1.04386 | 9.199798 |
| _cons | 56.5833 | 2.666439 | 21.22 | 0.000 | 51.24385 | 61.92276 |

Set 3: All Regional Dummies (except for region 1-control region)

1. Regression of Poverty Incidence

Regression with robust standard errors

Number of obs = 72
 F(26, 45) = 24.66
 Prob > F = 0.0000
 R-squared = 0.8120
 Root MSE = 9.4021

| | Coef. | Robust Std. Err. | t | P> t | [95% Conf. Interval] | |
|----------|-----------|------------------|-------|-------|----------------------|-----------|
| bpov00 | | | | | | |
| bpov91 | .3549066 | .0800031 | 4.44 | 0.000 | .1937722 | .516041 |
| clim2 | 2.38082 | 5.703119 | 0.42 | 0.678 | -9.10585 | 13.86749 |
| clim3 | 10.0017 | 4.575454 | 2.19 | 0.034 | .7862657 | 19.21714 |
| clim4 | 7.779277 | 5.179178 | 1.50 | 0.140 | -2.652122 | 18.21068 |
| ftyphoon | -.8439154 | 4.719102 | -0.18 | 0.859 | -10.34868 | 8.660845 |
| popden90 | .0052801 | .0095918 | 0.55 | 0.585 | -.0140387 | .0245989 |
| propinld | -.2043762 | .0618786 | -3.30 | 0.002 | -.3290061 | -.0797464 |
| popcap | -7.713184 | 6.110073 | -1.26 | 0.213 | -20.0195 | 4.593134 |
| intlport | -1.054788 | 4.621686 | -0.23 | 0.821 | -10.36334 | 8.253765 |
| ports | -.2110488 | .1101607 | -1.92 | 0.062 | -.4329238 | .0108262 |
| rdens90 | -4.03735 | 7.14934 | -0.56 | 0.575 | -18.43686 | 10.36216 |
| dyna | 5.29775 | 8.343898 | 0.63 | 0.529 | -11.50772 | 22.10322 |
| regcar | 6.506003 | 7.136113 | 0.91 | 0.367 | -7.866865 | 20.87887 |
| reg2 | .0408747 | 7.528989 | 0.01 | 0.996 | -15.12329 | 15.20504 |
| reg3 | 8.031328 | 8.019654 | 1.00 | 0.322 | -8.121084 | 24.18374 |
| reg4 | 3.599681 | 6.173772 | 0.58 | 0.563 | -8.834934 | 16.03429 |
| reg5 | 13.197 | 8.890349 | 1.48 | 0.145 | -4.70908 | 31.10308 |
| reg6 | -.2265727 | 6.770788 | -0.03 | 0.973 | -13.86364 | 13.41049 |
| reg7 | 3.802154 | 11.80178 | 0.32 | 0.749 | -19.96784 | 27.57215 |
| reg8 | 9.442567 | 10.20553 | 0.93 | 0.360 | -11.11242 | 29.99756 |
| reg9 | 11.40888 | 10.21033 | 1.12 | 0.270 | -9.155779 | 31.97354 |
| reg10 | -3.263505 | 10.16959 | -0.32 | 0.750 | -23.7461 | 17.21909 |
| reg11 | -15.69932 | 12.75714 | -1.23 | 0.225 | -41.39352 | 9.994889 |
| reg12 | 9.877608 | 9.914412 | 1.00 | 0.324 | -10.09104 | 29.84626 |
| muslmin | 30.84241 | 13.12496 | 2.35 | 0.023 | 4.407389 | 57.27743 |
| regcarag | 5.765873 | 10.65919 | 0.54 | 0.591 | -15.70285 | 27.23459 |
| _cons | 22.54579 | 8.3528 | 2.70 | 0.010 | 5.722391 | 39.3692 |

2. Regression of Per Capita Income

Regression with robust standard errors

Number of obs = 72
 F(26, 45) = 6.23
 Prob > F = 0.0000
 R-squared = 0.6973
 Root MSE = 4121.2

| | Coef. | Robust Std. Err. | t | P> t | [95% Conf. Interval] | |
|----------|-----------|------------------|-------|-------|----------------------|-----------|
| pcinc | | | | | | |
| bpov91 | -126.7328 | 33.94646 | -3.73 | 0.001 | -195.1045 | -58.36117 |
| clim2 | -1213.849 | 2844.832 | -0.43 | 0.672 | -6943.635 | 4515.936 |
| clim3 | -2971.981 | 1745.179 | -1.70 | 0.095 | -6486.952 | 542.99 |
| clim4 | -1339.217 | 2297.541 | -0.58 | 0.563 | -5966.701 | 3288.267 |
| ftyphoon | -289.4454 | 1903.102 | -0.15 | 0.880 | -4122.489 | 3543.598 |
| popden90 | 2.645923 | 4.118027 | 0.64 | 0.524 | -5.648209 | 10.94006 |
| propinld | 61.61095 | 27.53398 | 2.24 | 0.030 | 6.154659 | 117.0672 |
| popcap | 1152.652 | 2627.763 | 0.44 | 0.663 | -4139.935 | 6445.239 |
| intlport | -1732.337 | 2662.049 | -0.65 | 0.519 | -7093.978 | 3629.304 |
| ports | 56.28206 | 56.60641 | 0.99 | 0.325 | -57.72911 | 170.2932 |
| rdens90 | 2234.85 | 2103.308 | 1.06 | 0.294 | -2001.43 | 6471.131 |
| dyna | -1380.576 | 2680.161 | -0.52 | 0.609 | -6778.697 | 4017.546 |
| regcar | 1177.72 | 4013.28 | 0.29 | 0.771 | -6905.442 | 9260.881 |
| reg2 | -368.3345 | 3831.39 | -0.10 | 0.924 | -8085.15 | 7348.481 |
| reg3 | -3739.719 | 4288.288 | -0.87 | 0.388 | -12376.77 | 4897.337 |
| reg4 | -812.6245 | 3388.865 | -0.24 | 0.812 | -7638.149 | 6012.9 |

| | | | | | | |
|----------|-----------|----------|-------|-------|-----------|-----------|
| reg5 | -3033.103 | 3945.175 | -0.77 | 0.446 | -10979.09 | 4912.887 |
| reg6 | -509.8455 | 3499.503 | -0.15 | 0.885 | -7558.207 | 6538.516 |
| reg7 | 200.1055 | 4893.592 | 0.04 | 0.968 | -9656.094 | 10056.31 |
| reg8 | -1603.438 | 4459.485 | -0.36 | 0.721 | -10585.3 | 7378.424 |
| reg9 | -2422.529 | 5014.59 | -0.48 | 0.631 | -12522.43 | 7677.374 |
| reg10 | 3623.581 | 4294.059 | 0.84 | 0.403 | -5025.099 | 12272.26 |
| reg11 | 4184.261 | 5859.202 | 0.71 | 0.479 | -7616.777 | 15985.3 |
| reg12 | -2962.188 | 6001.371 | -0.49 | 0.624 | -15049.57 | 9125.194 |
| muslmin | -10962.89 | 4678.283 | -2.34 | 0.024 | -20385.43 | -1540.343 |
| regcarag | -3599.233 | 4861.494 | -0.74 | 0.463 | -13390.78 | 6192.318 |
| _cons | 26756.7 | 4203.652 | 6.37 | 0.000 | 18290.11 | 35223.29 |

3. Regression of Cohort Survival Rate

Regression with robust standard errors

Number of obs = 72
F(26, 45) = 55.15
Prob > F = 0.0000
R-squared = 0.8805
Root MSE = 6.3205

| cohor99 | Coef. | Robust Std. Err. | t | P> t | [95% Conf. Interval] | |
|----------|-----------|------------------|-------|-------|----------------------|-----------|
| bpov91 | -.0459709 | .0514258 | -0.89 | 0.376 | -.1495478 | .0576061 |
| clim2 | 13.02243 | 5.088929 | 2.56 | 0.014 | 2.772798 | 23.27206 |
| clim3 | -.4316711 | 3.680082 | -0.12 | 0.907 | -7.843738 | 6.980395 |
| clim4 | 9.70913 | 4.450197 | 2.18 | 0.034 | .7459722 | 18.67229 |
| ftyphoon | -6.827525 | 3.701071 | -1.84 | 0.072 | -14.28187 | .6268147 |
| popden90 | .0229521 | .0065439 | 3.51 | 0.001 | .0097719 | .0361323 |
| propinld | -.0657453 | .0334427 | -1.97 | 0.055 | -.1331024 | .0016119 |
| popcap | 4.283721 | 3.861065 | 1.11 | 0.273 | -3.492862 | 12.0603 |
| intlport | 3.998871 | 4.703874 | 0.85 | 0.400 | -5.475217 | 13.47296 |
| ports | -.2427441 | .0867348 | -2.80 | 0.008 | -.4174369 | -.0680512 |
| rdens90 | 5.775917 | 4.042198 | 1.43 | 0.160 | -2.365487 | 13.91732 |
| dyna | -11.06538 | 4.230364 | -2.62 | 0.012 | -19.58577 | -2.544989 |
| regcar | -8.012334 | 5.19454 | -1.54 | 0.130 | -18.47467 | 2.450007 |
| reg2 | -4.390806 | 5.132871 | -0.86 | 0.397 | -14.72894 | 5.947326 |
| reg3 | -.7455921 | 3.090169 | -0.24 | 0.810 | -6.969513 | 5.478329 |
| reg4 | -9.150505 | 3.886539 | -2.35 | 0.023 | -16.9784 | -1.322613 |
| reg5 | -19.30712 | 5.521118 | -3.50 | 0.001 | -30.42722 | -8.187021 |
| reg6 | -9.996664 | 5.166378 | -1.93 | 0.059 | -20.40228 | .4089552 |
| reg7 | -19.42798 | 8.479234 | -2.29 | 0.027 | -36.50603 | -2.349922 |
| reg8 | -29.35256 | 6.146719 | -4.78 | 0.000 | -41.73268 | -16.97243 |
| reg9 | -36.13136 | 6.599122 | -5.48 | 0.000 | -49.42267 | -22.84004 |
| reg10 | -26.34029 | 7.059269 | -3.73 | 0.001 | -40.55838 | -12.12219 |
| reg11 | -34.82534 | 8.567915 | -4.06 | 0.000 | -52.08201 | -17.56867 |
| reg12 | -22.49328 | 6.362187 | -3.54 | 0.001 | -35.30738 | -9.679174 |
| muslmin | -54.66709 | 7.921329 | -6.90 | 0.000 | -70.62147 | -38.71272 |
| regcarag | -41.24465 | 8.807026 | -4.68 | 0.000 | -58.98291 | -23.50639 |
| _cons | 79.67691 | 4.551769 | 17.50 | 0.000 | 70.50917 | 88.84464 |

4. Regression of Infant Mortality Rate

Regression with robust standard errors

Number of obs = 72
F(26, 45) = 24.00
Prob > F = 0.0000
R-squared = 0.8652
Root MSE = 3.3715

| infm95 | Coef. | Robust Std. Err. | t | P> t | [95% Conf. Interval] | |
|----------|-----------|------------------|-------|-------|----------------------|----------|
| bpov91 | .0300037 | .0260015 | 1.15 | 0.255 | -.0223661 | .0823735 |
| clim2 | 1.774538 | 2.680601 | 0.66 | 0.511 | -3.62447 | 7.173547 |
| clim3 | 1.164258 | 1.968525 | 0.59 | 0.557 | -2.800555 | 5.129071 |
| clim4 | .8483746 | 2.345122 | 0.36 | 0.719 | -3.874944 | 5.571693 |
| ftyphoon | -.5707488 | 2.846529 | -0.20 | 0.842 | -6.303952 | 5.162455 |

| | | | | | | |
|----------|-----------|----------|-------|-------|-----------|-----------|
| popden90 | -.0089372 | .0029894 | -2.99 | 0.005 | -.0149581 | -.0029162 |
| propinld | -.040097 | .0173939 | -2.31 | 0.026 | -.0751301 | -.0050639 |
| popcap | -.2555818 | 2.068705 | -0.12 | 0.902 | -4.422168 | 3.911005 |
| intlport | -1.296357 | 1.806573 | -0.72 | 0.477 | -4.934982 | 2.342268 |
| ports | -.1549663 | .0499667 | -3.10 | 0.003 | -.2556044 | -.0543281 |
| rdens90 | -2.251387 | 1.84548 | -1.22 | 0.229 | -5.968375 | 1.465601 |
| dyna | -.4510796 | 1.632949 | -0.28 | 0.784 | -3.740007 | 2.837848 |
| regcar | 7.669565 | 2.714111 | 2.83 | 0.007 | 2.203066 | 13.13606 |
| reg2 | 6.823358 | 3.115418 | 2.19 | 0.034 | .5485847 | 13.09813 |
| reg3 | -3.15512 | 2.011939 | -1.57 | 0.124 | -7.207373 | .8971325 |
| reg4 | 2.606246 | 2.230055 | 1.17 | 0.249 | -1.885314 | 7.097807 |
| reg5 | 6.574927 | 2.926878 | 2.25 | 0.030 | .6798917 | 12.46996 |
| reg6 | 6.93254 | 3.035024 | 2.28 | 0.027 | .8196883 | 13.04539 |
| reg7 | 2.797449 | 3.572768 | 0.78 | 0.438 | -4.398475 | 9.993372 |
| reg8 | 7.764668 | 3.375719 | 2.30 | 0.026 | .9656215 | 14.56371 |
| reg9 | 7.192159 | 3.591194 | 2.00 | 0.051 | -.0408773 | 14.42519 |
| reg10 | 2.198718 | 3.906843 | 0.56 | 0.576 | -5.670067 | 10.0675 |
| reg11 | .9290625 | 4.863533 | 0.19 | 0.849 | -8.866596 | 10.72472 |
| reg12 | .6801151 | 3.892288 | 0.17 | 0.862 | -7.159355 | 8.519585 |
| muslmin | 17.28138 | 3.423808 | 5.05 | 0.000 | 10.38548 | 24.17728 |
| regcarag | 5.22849 | 4.964673 | 1.05 | 0.298 | -4.770874 | 15.22785 |
| _cons | 56.17272 | 3.74577 | 15.00 | 0.000 | 48.62835 | 63.71709 |

Set 4: Cordillera Regional Dummy only

1. Regression of **Poverty Incidence** against dummy for Cordillera Region and control variables

Regression with robust standard errors

Number of obs = 72
F(13, 58) = 10.75
Prob > F = 0.0000
R-squared = 0.5837
Root MSE = 12.322

| bpov00 | Coef. | Robust Std. Err. | t | P> t | [95% Conf. Interval] | |
|----------|-----------|------------------|-------|-------|----------------------|-----------|
| bpov91 | .2726329 | .0973504 | 2.80 | 0.007 | .0777649 | .4675008 |
| clim2 | 7.858883 | 5.753936 | 1.37 | 0.177 | -3.658872 | 19.37664 |
| clim3 | 11.6521 | 4.033811 | 2.89 | 0.005 | 3.577552 | 19.72665 |
| clim4 | 13.58219 | 6.020514 | 2.26 | 0.028 | 1.53082 | 25.63356 |
| ftyphoon | -1.741021 | 4.138357 | -0.42 | 0.676 | -10.02484 | 6.5428 |
| popden90 | .0042428 | .0119659 | 0.35 | 0.724 | -.0197095 | .0281952 |
| propinld | -.181516 | .0599532 | -3.03 | 0.004 | -.3015253 | -.0615068 |
| popcap | -11.40474 | 7.401493 | -1.54 | 0.129 | -26.22044 | 3.410953 |
| intlport | .9929119 | 4.221999 | 0.24 | 0.815 | -7.458336 | 9.44416 |
| ports | -.285936 | .1512005 | -1.89 | 0.064 | -.5885966 | .0167246 |
| rdens90 | -6.231926 | 8.033579 | -0.78 | 0.441 | -22.31288 | 9.849029 |
| dyna | 12.15353 | 11.90259 | 1.02 | 0.311 | -11.67209 | 35.97916 |
| regcar | 3.189822 | 5.368534 | 0.59 | 0.555 | -7.556466 | 13.93611 |
| _cons | 31.03349 | 8.01962 | 3.87 | 0.000 | 14.98047 | 47.0865 |

2. Regression of **Per Capita Income** against dummy for Cordillera Region and control variables

Regression with robust standard errors

Number of obs = 72
F(13, 58) = 6.16
Prob > F = 0.0000
R-squared = 0.4767
Root MSE = 4773.1

| pcinc | Coef. | Robust Std. Err. | t | P> t | [95% Conf. Interval] | |
|--------|-----------|------------------|-------|-------|----------------------|-----------|
| bpov91 | -83.90184 | 35.346 | -2.37 | 0.021 | -154.6545 | -13.14914 |
| clim2 | -2768.008 | 2252.37 | -1.23 | 0.224 | -7276.617 | 1740.601 |
| clim3 | -2777.982 | 1840.005 | -1.51 | 0.137 | -6461.153 | 905.1885 |

| | | | | | | |
|----------|-----------|----------|-------|-------|-----------|----------|
| clim4 | -2979.066 | 2168.482 | -1.37 | 0.175 | -7319.755 | 1361.623 |
| ftyphoon | 370.3027 | 1420.643 | 0.26 | 0.795 | -2473.424 | 3214.029 |
| popden90 | 3.234075 | 4.972384 | 0.65 | 0.518 | -6.719232 | 13.18738 |
| propinld | 41.8693 | 24.3897 | 1.72 | 0.091 | -6.951981 | 90.69059 |
| popcap | 2150.082 | 2888.573 | 0.74 | 0.460 | -3632.024 | 7932.188 |
| intlport | -2295.52 | 2450.154 | -0.94 | 0.353 | -7200.036 | 2608.995 |
| ports | 90.39246 | 65.35891 | 1.38 | 0.172 | -40.4376 | 221.2225 |
| rdens90 | 3747.769 | 2670.981 | 1.40 | 0.166 | -1598.781 | 9094.318 |
| dyna | -4827.447 | 3448.034 | -1.40 | 0.167 | -11729.44 | 2074.544 |
| regcar | 2561.521 | 2168.366 | 1.18 | 0.242 | -1778.934 | 6901.977 |
| _cons | 23103.34 | 3327.643 | 6.94 | 0.000 | 16442.34 | 29764.34 |

3. Regression of **Cohort Survival Rate** against dummy for Cordillera Region and control variables

Regression with robust standard errors

Number of obs = 72
F(13, 58) = 11.68
Prob > F = 0.0000
R-squared = 0.5986
Root MSE = 10.202

| cohor99 | Coef. | Robust Std. Err. | t | P> t | [95% Conf. Interval] | |
|----------|-----------|------------------|-------|-------|----------------------|-----------|
| bpov91 | -.06006 | .0731784 | -0.82 | 0.415 | -.2065425 | .0864226 |
| clim2 | -5.570423 | 4.782627 | -1.16 | 0.249 | -15.14389 | 4.003045 |
| clim3 | -7.167693 | 3.475757 | -2.06 | 0.044 | -14.12518 | -.2102086 |
| clim4 | -5.869098 | 4.263206 | -1.38 | 0.174 | -14.40283 | 2.664636 |
| ftyphoon | 12.12723 | 3.369685 | 3.60 | 0.001 | 5.382072 | 18.87239 |
| popden90 | .0111158 | .0108685 | 1.02 | 0.311 | -.0106399 | .0328715 |
| propinld | -.0504044 | .0506754 | -0.99 | 0.324 | -.1518422 | .0510334 |
| popcap | 11.51056 | 6.658654 | 1.73 | 0.089 | -1.81818 | 24.83931 |
| intlport | 1.082097 | 5.133991 | 0.21 | 0.834 | -9.194702 | 11.3589 |
| ports | .0280595 | .1042867 | 0.27 | 0.789 | -.1806931 | .236812 |
| rdens90 | 14.6813 | 7.841118 | 1.87 | 0.066 | -1.0144 | 30.377 |
| dyna | -18.22022 | 6.966164 | -2.62 | 0.011 | -32.16451 | -4.27593 |
| regcar | -4.342865 | 3.787341 | -1.15 | 0.256 | -11.92405 | 3.238321 |
| _cons | 52.41496 | 6.69614 | 7.83 | 0.000 | 39.01118 | 65.81874 |

4. Regression of **Infant Mortality Rate** against dummy for Cordillera Region and control variables

Regression with robust standard errors

Number of obs = 72
F(13, 58) = 15.19
Prob > F = 0.0000
R-squared = 0.6219
Root MSE = 4.9733

| infm95 | Coef. | Robust Std. Err. | t | P> t | [95% Conf. Interval] | |
|----------|-----------|------------------|-------|-------|----------------------|-----------|
| bpov91 | -.0067819 | .0314544 | -0.22 | 0.830 | -.0697447 | .0561809 |
| clim2 | 7.295568 | 2.294489 | 3.18 | 0.002 | 2.702649 | 11.88849 |
| clim3 | 5.828455 | 1.829181 | 3.19 | 0.002 | 2.166951 | 9.48996 |
| clim4 | 6.483783 | 2.555802 | 2.54 | 0.014 | 1.36779 | 11.59978 |
| ftyphoon | -1.779728 | 1.64569 | -1.08 | 0.284 | -5.073935 | 1.514479 |
| popden90 | -.0118192 | .0043859 | -2.69 | 0.009 | -.0205986 | -.0030398 |
| propinld | -.0429684 | .0230647 | -1.86 | 0.068 | -.0891375 | .0032006 |
| popcap | -2.927225 | 3.02141 | -0.97 | 0.337 | -8.975234 | 3.120785 |
| intlport | -1.930017 | 2.226519 | -0.87 | 0.390 | -6.38688 | 2.526845 |
| ports | -.1829708 | .0675568 | -2.71 | 0.009 | -.3182005 | -.0477412 |
| rdens90 | -2.303061 | 2.364833 | -0.97 | 0.334 | -7.036789 | 2.430667 |
| dyna | 2.635438 | 3.511768 | 0.75 | 0.456 | -4.394129 | 9.665004 |
| regcar | 6.175759 | 2.393091 | 2.58 | 0.012 | 1.385466 | 10.96605 |
| _cons | 60.64278 | 3.766942 | 16.10 | 0.000 | 53.10243 | 68.18313 |

| REGRESSION VARIABLES | DEFINITION | SOURCE |
|----------------------|------------|--------|
|----------------------|------------|--------|

DEPENDENT VARIABLES

| | | |
|----------------|--|--------------------------|
| bpov00 | Poverty incidence 2000 using consistent method (Balisacan) | NSO; Balisacan 2002 |
| pcinc | Per Capita Income 2000 | NSO |
| cohor99 | cohort survival rates adjusted for participation rates 1999-2000 | DepEd; NSO |
| infm95 | infant mortality 1995 | Flieger and Cabigon 1998 |

INDEPENDENT VARIABLES

Ecological Variables

| | | |
|-----------------|---|------------|
| clim2 | Dummy for province mostly or entirely under climate 2 | NAMRIA map |
| clim3 | Dummy for province mostly or entirely under climate 3 | NAMRIA map |
| clim4 | Dummy for province mostly or entirely under climate 4 | NAMRIA map |
| ftyphoon | Dummy for very frequent (25-32%) typhoons | NAMRIA map |

Market Access Variables

| | | |
|-----------------|--|------|
| propinld | Proportion of population in inland municipalities 1990 | NSO |
| popcap | Percent of popn w/in 2 municipalities distance of provincial commercial capital 1990 | NSO |
| popden90 | Population Density 1990 | NSO |
| Intlport | Dummy for international air/sea port | |
| ports | No. of operational commercial ports | NSCB |
| rdens90 | Road density 1990 | DPWH |

Political variable

| | | |
|-------------|---|----------------------------|
| dyna | Percent of provincial officials (governor, vice governor, congressmen) in 1998 related by blood or marriage | Interviews, Balisacan 2002 |
|-------------|---|----------------------------|

Regional Dummy Variable

| | |
|----------------|----------------------------------|
| muslmin | Dummy for Muslim Mindanao region |
| regcar | Dummy for Cordillera region |
| reg2 | Dummy for Region 2 |
| reg3 | Dummy for Region 3 |
| reg4 | Dummy for Region 4 |
| reg5 | Dummy for Region 5 |
| reg6 | Dummy for Region 6 |
| reg7 | Dummy for Region 7 |
| reg8 | Dummy for Region 8 |
| reg9 | Dummy for Region 9 |

| | |
|-----------------|-------------------------|
| reg10 | Dummy for Region 10 |
| reg11 | Dummy for Region 11 |
| reg12 | Dummy for Region 12 |
| Regcarag | Dummy for Caraga Region |

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