# Time series (3)

**3. Time patterns: Growth rate and seasonality**

**3.1 Estimate a growth rate with the regression of ln(y) on t**

GDP per capita in 2000 US$, 1960-2006

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source: http://devdata.worldbank.org/dataonline/

. g lchinagdppc=log(chinagdppc)

. reg lchinagdppc year

 Source | SS df MS Number of obs = 47

-------------+------------------------------ F( 1, 45) = 1584.55

 Model | 38.968173 1 38.968173 Prob > F = 0.0000

 Residual | 1.10666636 45 .024592586 R-squared = 0.9724

-------------+------------------------------ Adj R-squared = 0.9718

 Total | 40.0748393 46 .871192159 Root MSE = .15682

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 lchinagdppc | Coef. Std. Err. t P>|t| [95% Conf. Interval]

-------------+----------------------------------------------------------------

 year | .067127 .0016863 39.81 0.000 .0637305 .0705234

 \_cons | -126.0574 3.344084 -37.70 0.000 -132.7927 -119.3221

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. g lindiagdppc=log(indiagdppc)

. reg lindiagdppc year

 Source | SS df MS Number of obs = 47

-------------+------------------------------ F( 1, 45) = 595.49

 Model | 5.75678667 1 5.75678667 Prob > F = 0.0000

 Residual | .435026632 45 .009667258 R-squared = 0.9297

-------------+------------------------------ Adj R-squared = 0.9282

 Total | 6.1918133 46 .134604637 Root MSE = .09832

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 lindiagdppc | Coef. Std. Err. t P>|t| [95% Conf. Interval]

-------------+----------------------------------------------------------------

 year | .0258007 .0010573 24.40 0.000 .0236713 .0279302

 \_cons | -41.75061 2.096654 -19.91 0.000 -45.97348 -37.52773

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**3.2. Seasonality**

 | year month cons time |

 |------------------------------|

 1. | 2001 1 1225.016 1 |

 2. | 2001 2 985.609 2 |

 3. | 2001 3 891.438 3 |

 4. | 2001 4 574.492 4 |

 5. | 2001 5 355.583 5 |

 |------------------------------|

 6. | 2001 6 290.759 6 |

 7. | 2001 7 276.641 7 |

 8. | 2001 8 270.324 8 |

 9. | 2001 9 273.712 9 |

 10. | 2001 10 403.192 10 |

 |------------------------------|

 11. | 2001 11 536.788 11 |

 12. | 2001 12 816.055 12 |

 13. | 2002 1 1038.648 13 | Source: Energy Information Administration

 14. | 2002 2 909.404 14 | November 2006 Monthly Energy Review

. tab month, gen(month)

. reg cons time month1-month12, nocons

 Source | SS df MS Number of obs = 68

-------------+------------------------------ F( 13, 55) = 777.50

 Model | 29370688.7 13 2259283.75 Prob > F = 0.0000

 Residual | 159820.319 55 2905.82397 R-squared = 0.9946

-------------+------------------------------ Adj R-squared = 0.9933

 Total | 29530509 68 434272.191 Root MSE = 53.906

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 cons | Coef. Std. Err. t P>|t| [95% Conf. Interval]

-------------+----------------------------------------------------------------

 time | -.4993901 .3348244 -1.49 0.142 -1.170393 .1716131

 month1 | 1140.733 24.33186 46.88 0.000 1091.971 1189.495

 month2 | 1009.691 24.47656 41.25 0.000 960.6394 1058.744

 month3 | 871.6912 24.62497 35.40 0.000 822.3417 921.0408

 month4 | 574.5008 24.77701 23.19 0.000 524.8465 624.155

 month5 | 399.4392 24.93262 16.02 0.000 349.4731 449.4052

 month6 | 313.4942 25.09174 12.49 0.000 263.2092 363.7792

 month7 | 288.8859 25.25429 11.44 0.000 238.2752 339.4967

 month8 | 284.7268 25.42021 11.20 0.000 233.7836 335.6701

 month9 | 289.6065 26.51886 10.92 0.000 236.4615 342.7515

 month10 | 410.6397 26.6601 15.40 0.000 357.2116 464.0677

 month11 | 602.2259 26.80478 22.47 0.000 548.5079 655.9438

 month12 | 963.4642 26.95285 35.75 0.000 909.4495 1017.479

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**Computing a seasonally adjusted series**

gen average=(\_b[month1]+\_b[month2]+\_b[month3]+\_b[month4]+\_b[month5]+\_b[month6]+

 \_b[month7]+\_b[month8]+\_b[month9]+\_b[month10]+\_b[month11]+\_b[month12])/12

gen monthbase=0

replace monthbase=\_b[month1] if month==1

- - -- - -

replace monthbase=\_b[month12] if month==12

gen cons\_seasonadj=cons-monthbase +average;

twoway line cons seasonadj trend time

. xtreg cons time, i(month) fe;

 F(1,55) = 2.22

corr(u\_i, Xb) = 0.0701 Prob > F = 0.1415

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 cons | Coef. Std. Err. t P>|t| [95% Conf. Interval]

-------------+----------------------------------------------------------------

 time | -.4993901 .3348244 -1.49 0.142 -1.170393 .1716131

 \_cons | 597.4802 13.27285 45.02 0.000 570.8809 624.0796

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 sigma\_u | 318.705

 sigma\_e | 53.905695

 rho | .9721874 (fraction of variance due to u\_i)

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F test that all u\_i=0: F(11, 55) = 200.50 Prob > F = 0.0000