

Online Supplementary Appendix to “Status
Preference and the Effects of Patent Protection:
Theory and Evidence”

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This supplementary appendix provides complete dataset descriptions, regression results and extended theoretical models with absolute wealth preference and finite patent length in the paper.

Part A: Complete Appendix of Empirical Evidence

A.1 Description of the Dataset in the Empirical Model

The empirical analysis is based on a panel dataset for 61 countries and regions. Variables used for estimation are listed below with their data sources. The names of countries and the classification of the regions in the dataset are also listed.

The variables of the annual change rate (i.e., economic growth rate, population growth rate and inflation rate) are calculated through logged differences. In the cross-section regression, the data of the annual variables are averaged between years 1980 and 2009.

- y : the average annual growth rate of real GDP per capita. Source: Penn World Table 7.1.
- ly_0 : the logged value of per capita GDP at the initial year of each sample period. Source: Penn World Table 7.1.
- lki : the average logged value of gross investment ratio, where the gross investment ratio is measured as the investment share of PPP converted GDP per capita at 2005 constant prices. Source: Penn World Table 7.1.
- $ledu$: the degree of initial human capital stock, measured as the logged value of the average years of secondary education for people above 15 at the initial year of each sample period. Source: Barro and Lee (2013).
- ipr : the degree of patent protection, measured by the averaged index of intellectual property rights in each period. Source: Park (2008).
- spv : status preference values, measured by the fraction of respondents who selected *thrift saving money and things* as an important quality of each country in each wave of the World Values Survey. The first alternative measure is the averaged fraction of respondents who selected both *thrift saving money and things* and *hard work* as important qualities of each country. The second one

is the averaged fraction of respondents who strongly agree or agree with the view “people who don’t work turn lazy” in each country. Source: World Values Survey (WVS, 2015).

- pop: the average annual growth rate of the population. Source: Penn World Table 7.1.
- inf: the average annual rate of inflation. Source: Penn World Table 7.1.
- trd: the degree of openness, measured by the average ratio of export plus import to GDP. Source: Penn World Table 7.1.
- gov: the average ratio of government consumption to GDP. Source: Penn World Table 7.1.
- fdi: the net inflow of FDI as a share of GDP. The data for Taiwan is unavailable, so it is excluded in the regression where fdi is included. Source: World Development Indicators (World Bank, 2013).

List of countries or regions:

Algeria, Argentina, Australia, Bangladesh, Brazil, Bulgaria, Canada, Chile, China, Columbia, Cyprus, Dominican Rep., Egypt, El Salvador, Finland, France, Germany, Ghana, Guatemala, Hong Kong, Hungary, India, Indonesia, Iran, Iraq, Israel, Italy, Jordan, Japan, South Korea, Morocco, Mexico, Mali, Malaysia, Netherlands, Norway, New Zealand, Pakistan, Peru, Philippines, Poland, Romania, Rwanda, Singapore, South Africa, Spain, Sweden, Switzerland, Tanzania, Thailand, Trinidad and Tobago, Turkey, Taiwan, Uganda, United Kingdom, United States, Uruguay, Venezuela, Vietnam, Zambia and Zimbabwe.

Country classification of religious denominations:

- Catholic: Argentina, Brazil, Canada, Chile, Columbia, Dominican Rep., El Salvador, France, Guatemala, Hungary, Italy, Mexico, Netherlands, New Zealand, Peru, Philippines, Poland, Rwanda, Spain, Switzerland, Great Britain, Uruguay, Venezuela.

- Protestant: Australia, Finland, Germany, Ghana, Norway, South Africa, Sweden, Trinidad and Tobago, Uganda, United States, Zambia.
- Orthodox: Bulgaria, Cyprus, Romania.
- Jewish: Israel.
- Muslim: Algeria, Bangladesh, Egypt, Indonesia, Iran, Iraq, Jordan, Malaysia, Mali, Morocco, Pakistan, Tanzania, Turkey.
- Hindu: India.
- Buddhist: China, South Korea, Singapore, Taiwan, Thailand, Vietnam
- Other Affiliations: Hong Kong, Japan, Zimbabwe.

Table I Summary Statistics of Status Preference Values (in Percentage)

| Code | Nob | Mean | St.dev. | Max | Min | Max-Min |
|------|-----|-------|---------|-------|-------|---------|
| ARG | 5 | 15.45 | 0.59 | 16.02 | 14.57 | 1.45 |
| AUS | 3 | 22.48 | 9.66 | 33.50 | 15.47 | 18.03 |
| BGD | 2 | 54.40 | 4.14 | 57.33 | 51.48 | 5.85 |
| BGR | 2 | 42.66 | 1.14 | 43.47 | 41.86 | 1.61 |
| BRA | 3 | 32.35 | 5.48 | 38.64 | 28.67 | 9.97 |
| CAN | 2 | 28.20 | 0.40 | 28.48 | 27.91 | 0.57 |
| CHE | 3 | 33.88 | 10.26 | 41.93 | 22.32 | 19.61 |
| CHL | 4 | 32.66 | 4.10 | 37.50 | 28.53 | 8.97 |
| CHN | 4 | 59.43 | 3.57 | 62.73 | 55.60 | 7.13 |
| COL | 2 | 36.67 | 16.35 | 48.23 | 25.11 | 23.12 |
| CYP | 1 | 40.48 | - | 40.48 | 40.48 | 0 |
| DEU | 2 | 51.94 | 1.24 | 52.81 | 51.07 | 1.74 |

| | | | | | | |
|-----|---|-------|-------|-------|-------|-------|
| DOM | 1 | 11.27 | - | 11.27 | 11.27 | 0 |
| DZA | 1 | 17.94 | - | 17.94 | 17.94 | 0 |
| EGY | 2 | 17.90 | 13.95 | 27.76 | 8.03 | 19.73 |
| ESP | 4 | 21.52 | 6.82 | 31.60 | 16.49 | 15.11 |
| FIN | 3 | 18.67 | 16.21 | 29.18 | 0 | 29.18 |
| FRA | 1 | 42.75 | - | 42.75 | 42.75 | 0 |
| GBR | 2 | 27.04 | 2.91 | 29.09 | 24.98 | 4.11 |
| GHA | 1 | 19.56 | - | 19.56 | 19.56 | 0 |
| GTM | 1 | 38.60 | - | 38.60 | 38.60 | 0 |
| HKG | 1 | 1.84 | - | 1.84 | 1.84 | 0 |
| HUN | 2 | 37.21 | 6.35 | 41.69 | 32.72 | 8.97 |
| IDN | 2 | 49.67 | 3.28 | 51.99 | 47.34 | 4.65 |
| IND | 4 | 45.91 | 16.60 | 61.94 | 24.40 | 17.54 |
| IRN | 2 | 34.40 | 6.82 | 39.22 | 29.58 | 9.64 |
| IRQ | 2 | 29.90 | 2.38 | 31.58 | 28.22 | 3.36 |
| ISR | 1 | 19.77 | - | 19.77 | 19.77 | 0 |
| ITA | 1 | 39.43 | - | 39.43 | 39.43 | 0 |
| JOR | 2 | 21.90 | 3.56 | 24.42 | 19.38 | 5.04 |
| JPN | 5 | 43.00 | 8.19 | 52.28 | 30.81 | 21.47 |
| KOR | 5 | 58.68 | 15.75 | 72.75 | 33.61 | 39.14 |
| MAR | 2 | 40.39 | 6.52 | 45.00 | 35.78 | 9.22 |
| MEX | 5 | 34.17 | 13.72 | 48.86 | 11.87 | 36.99 |
| MLI | 1 | 44.07 | - | 44.07 | 44.07 | 0 |
| MYS | 1 | 50.71 | - | 50.71 | 50.71 | 0 |
| NLD | 1 | 41.71 | - | 41.71 | 41.71 | 0 |
| NOR | 2 | 13.59 | 0.52 | 13.95 | 13.22 | 0.73 |
| NZL | 2 | 29.24 | 5.79 | 33.33 | 25.15 | 8.18 |
| PAK | 2 | 56.37 | 1.31 | 57.30 | 55.45 | 1.85 |

| | | | | | | |
|---------|-----|-------|-------|-------|-------|-------|
| PER | 3 | 17.91 | 6.21 | 23.45 | 11.20 | 12.25 |
| PHL | 2 | 37.58 | 10.72 | 45.17 | 30.00 | 15.17 |
| POL | 3 | 36.77 | 31.89 | 56.81 | 0 | 56.81 |
| ROM | 2 | 56.80 | 5.39 | 60.61 | 52.98 | 7.63 |
| RWA | 1 | 24.09 | - | 24.09 | 24.09 | 0 |
| SGP | 1 | 38.23 | - | 38.23 | 38/23 | 0 |
| SLV | 1 | 29.82 | - | 29.82 | 29.82 | 0 |
| SWE | 3 | 36.95 | 6.22 | 42.12 | 30.05 | 12.07 |
| THA | 1 | 57.69 | - | 57.69 | 57.69 | 0 |
| TTO | 1 | 32.04 | - | 32.04 | 32.04 | 0 |
| TUR | 4 | 33.37 | 4.70 | 38.41 | 28.53 | 9.88 |
| TWN | 2 | 58.21 | 12.88 | 67.32 | 49.10 | 18.22 |
| TZA | 1 | 53.54 | - | 53.54 | 53.54 | 0 |
| UGA | 1 | 10.98 | - | 10.98 | 10.98 | 0 |
| URY | 2 | 24.75 | 2.48 | 26.50 | 23.00 | 3.50 |
| USA | 3 | 27.21 | 3.97 | 30.34 | 22.75 | 7.59 |
| VEN | 2 | 42.13 | 4.42 | 45.25 | 39.00 | 6.25 |
| VNM | 2 | 53.98 | 8.32 | 59.87 | 48.10 | 11.77 |
| ZAF | 5 | 26.26 | 10.53 | 36.91 | 14.79 | 22.12 |
| ZMB | 1 | 23.47 | - | 23.47 | 23.47 | 0 |
| ZWE | 1 | 21.16 | - | 21.16 | 21.16 | 0 |
| Overall | 134 | 34.98 | 15.57 | 72.75 | 0 | 72.75 |

A.2 Regression Results

Table II Baseline Regression 1: OLS Method

| | (1) | (2) | (3) | (4) |
|------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | OLS | OLS | OLS | OLS |
| ly0 | -0.0123*** (-4.23) | -0.0120*** (-4.07) | -0.0118*** (-3.99) | -0.0116*** (-4.09) |
| lki | 0.0250*** (4.25) | 0.0242*** (4.07) | 0.0232*** (4.00) | 0.0204** (2.64) |
| ledu | 0.00738*** (3.19) | 0.00716*** (3.05) | 0.00692*** (2.92) | 0.00675** (2.36) |
| pop | -0.692** (-2.61) | -0.690** (-2.64) | -0.675*** (-2.70) | -0.519** (-2.17) |
| ipr | 0.000393 (0.17) | 0.0102 (0.85) | 0.0208 (1.43) | 0.0172 (1.27) |
| ipr ² | | -0.00169 (-0.87) | -0.00212 (-1.12) | -0.00136 (-0.76) |
| spv×ipr | | | -0.0214 (-1.60) | -0.0212 (-1.55) |
| spv | 0.00128 (0.10) | 0.00415 (0.29) | 0.0625 (1.47) | 0.0675 (1.60) |
| trade | | | | -0.00103 (-0.18) |
| inflation | | | | -0.372 (-0.78) |
| gov | | | | -0.000667 (-0.01) |
| fdi | | | | 0.00116 (1.65) |
| constant | 0.170*** (5.15) | 0.152*** (3.77) | 0.124** (2.55) | 0.125** (2.45) |
| Observations | 61 | 61 | 61 | 60 |
| Adjusted R^2 | 0.486 | 0.483 | 0.498 | 0.507 |
| F | 6.099 | 5.333 | 5.530 | 5.146 |

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

The t statistics, in parentheses, are based on standard errors clustered by country.

Table III Baseline Regression 2: GMM Method
(Instrumented: Patent Protection)

| | (1) | (2) | (3) | (4) |
|------------------|-----------------------|-----------------------|------------------------|------------------------|
| | GMM | GMM | GMM | GMM |
| ly0 | -0.0109*** (-3.95) | -0.0107*** (-3.77) | -0.00976*** (-3.09) | -0.00950*** (-3.66) |
| lki | 0.0223*** (4.18) | 0.0217*** (3.99) | 0.0191*** (3.39) | 0.0130* (1.88) |
| ledu | 0.00598*** (2.73) | 0.00582** (2.60) | 0.00564** (2.48) | 0.00423 (1.52) |
| pop | -0.713*** (-2.76) | -0.708*** (-2.73) | -0.611** (-2.39) | -0.495* (-1.97) |
| ipr ² | | -0.00163 (-0.79) | -0.00337* (-1.75) | -0.00208 (-0.95) |
| ipr | 0.00111 (0.42) | 0.0106 (0.82) | 0.0345** (2.50) | 0.0260 (1.58) |
| spv×ipr | | | -0.0386*** (-3.03) | -0.0315** (-2.66) |
| spv | 0.00448 (0.35) | 0.00738 (0.53) | 0.113*** (2.70) | 0.102*** (2.84) |
| trade | | | | 0.00000850 (0.00) |
| inflation | | | | -0.577 (-1.01) |
| gov | | | | -0.0313 (-0.62) |
| fdi | | | | 0.00145* (1.79) |
| constant | 0.152*** (5.19) | 0.135*** (3.60) | 0.0702 (1.47) | 0.0838** (2.03) |
| Observations | 56 | 56 | 56 | 55 |
| OID | | | | |
| Endog | [0.914] | [0.988] | [0.020] | [0.090] |
| Adjusted R^2 | 0.400 | 0.394 | 0.333 | 0.422 |
| F | 8.749 | 7.383 | 8.789 | 4.814 |

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The t-statistics, in parentheses, are based on robust standard errors with a small sample. OID represents the Hansen's J test of overidentification. Endog stands for the GMM C chi-2 test of endogeneity. The corresponding p-values are in square brackets.

In this table, we assume ipr and $\text{spv} \times \text{ipr}$ are endogenous and use ipr_pre and $\text{spv} \times \text{ipr_pre}$ as instruments. The variable ipr_pre is the average degree of patent protection from 1960 to 1979. Due to missing data on average degree of patent protection between 1960 and 1979, the samples of Bulgaria, China, Hungary, Poland and Romania are dropped.

Table IV Baseline Regression 3: GMM Method
(Instrumented: Status Preference)

| | (1) | (2) | (3) | (4) |
|------------------|-----------------------|-----------------------|------------------------|-----------------------|
| | GMM | GMM | GMM | GMM |
| ly0 | -0.0104*** (-2.80) | -0.00910** (-2.53) | -0.00982*** (-3.97) | -0.00536* (-1.87) |
| lki | 0.0179** (2.34) | 0.0157** (2.04) | 0.0159** (2.41) | 0.00705 (0.92) |
| ledu | 0.00921*** (4.20) | 0.00857*** (3.59) | 0.00832*** (3.56) | 0.00933** (2.53) |
| pop | -0.543 (-1.50) | -0.441 (-1.42) | -0.501*** (-3.39) | 0.137 (0.35) |
| ipr ² | | -0.00332 (-1.66) | -0.00379*** (-3.67) | -0.00473** (-2.42) |
| ipr | -0.000963 (-0.43) | 0.0188 (1.58) | 0.0347*** (3.58) | 0.0496*** (3.41) |
| spv×ipr | | | -0.0347** (-2.17) | -0.0564*** (-3.32) |
| spv | 0.0403 (1.21) | 0.0520* (1.69) | 0.133** (2.61) | 0.246*** (4.21) |
| trade | | | | -0.00957* (-1.72) |
| inflation | | | | -1.361* (-1.79) |
| gov | | | | 0.0361 (1.03) |
| fdi | | | | 0.00264*** (2.98) |
| constant | 0.131** (2.48) | 0.0853 (1.44) | 0.0573 (1.44) | -0.0208 (-0.45) |
| Observations | 61 | 61 | 61 | 60 |
| OID | [0.183] | [0.180] | [0.419] | [0.312] |
| Endog | [0.230] | [0.169] | [0.015] | [0.006] |
| Adjusted R^2 | 0.377 | 0.333 | 0.405 | 0.054 |
| F | 11.06 | 7.875 | 10.06 | 6.267 |

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The t-statistics, in parentheses, are based on robust standard errors with a small sample. OID represents the Hansen's J test of overidentification. Endog stands for the GMM C chi-2 test of endogeneity. The corresponding p-values are in square brackets.

In this table, we assume $spv \times ipr$ and spv are endogenous variables and use dummy variables of country religious denomination and their interaction terms with ipr as instruments.

Table V Baseline Regression 4: GMM Method
(Instrumented: Both)

| | (1) | (2) | (3) | (4) |
|------------------|------------------------|-----------------------|------------------------|----------------------|
| | GMM | GMM | GMM | GMM |
| ly0 | -0.00995*** (-3.81) | -0.0101*** (-3.19) | -0.00921*** (-3.16) | -0.00322 (-1.08) |
| lki | 0.0151** (2.13) | 0.0156** (2.02) | 0.0132* (1.98) | -0.00128 (-0.14) |
| ledu | 0.00724*** (3.00) | 0.00688** (2.68) | 0.00575** (2.35) | 0.00379 (1.17) |
| pop | -0.324 (-1.63) | -0.355 (-1.45) | -0.283 (-1.46) | 0.506 (1.32) |
| ipr ² | | -0.00423** (-2.35) | -0.00543*** (-3.26) | -0.00623* (-1.94) |
| ipr | 0.00365 (1.15) | 0.0287** (2.39) | 0.0460*** (3.56) | 0.0579** (2.38) |
| spv × ipr | | | -0.0262* (-1.86) | -0.0417** (-2.10) |
| spv | 0.0545*** (3.05) | 0.0500** (2.16) | 0.120*** (2.94) | 0.213*** (4.29) |
| trade | | | | -0.00946 (-1.61) |
| inflation | | | | -1.515 (-1.64) |
| gov | | | | -0.0243 (-0.44) |
| fdi | | | | 0.00335*** (3.70) |
| constant | 0.103*** (3.28) | 0.0740 (1.64) | 0.0237 (0.57) | -0.0604 (-1.23) |
| Observations | 56 | 56 | 56 | 55 |
| OID | [0.490] | [0.473] | [0.256] | [0.353] |
| Endog | [0.065] | [0.074] | [0.233] | [0.070] |
| Adjusted R^2 | 0.153 | 0.209 | 0.181 | . |
| F | 15.36 | 11.70 | 16.96 | 24.61 |

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The t-statistics, in parentheses, are based on robust standard errors with a small sample. OID represents the Hansen's J test of overidentification. Endog stands for the GMM C chi-2 test of endogeneity. The corresponding p-values are in square brackets.

In this table, we assume ipr , $\text{spv} \times \text{ipr}$ and spv are endogenous variables and use ipr_pre , dummy variables of country religious denominations and the interaction terms between the dummy variables and ipr_pre as instruments. Due to missing data on average degree of patent protection between 1960 and 1979, the samples of Bulgaria, China, Hungary, Poland and Romania are dropped.

Table VI Sensitivity Analysis 1:
Alternative Measure of Status Preference I

| | (1) | (2) | (3) | (4) |
|------------------|-----------------------|------------------------|-----------------------|-----------------------|
| | OLS | GMM | GMM | GMM |
| ly0 | -0.0114*** (-3.66) | -0.00914*** (-3.23) | -0.00358 (-1.11) | -0.00175 (-0.48) |
| lki | 0.0203** (2.38) | 0.0123* (1.72) | 0.00159 (0.19) | -0.00554 (-0.67) |
| ledu | 0.00627** (2.06) | 0.00327 (1.11) | 0.00521 (1.38) | 0.00213 (0.58) |
| pop | -0.579** (-2.33) | -0.505 (-1.66) | -0.249 (-0.92) | -0.220 (-0.54) |
| ipr ² | -0.00116 (-0.63) | -0.00172 (-0.68) | -0.00345* (-1.96) | -0.00594** (-2.60) |
| ipr | 0.0123 (1.00) | 0.0178 (1.05) | 0.0322** (2.53) | 0.0469** (2.64) |
| spv × ipr | -0.0249* (-1.92) | -0.0288 (-1.60) | -0.0702*** (-4.59) | -0.0613** (-2.12) |
| spv | 0.0781* (1.91) | 0.0958* (1.93) | 0.285*** (4.74) | 0.265*** (2.97) |
| trade | 0.000774 (0.13) | 0.00262 (0.55) | 0.00295 (0.59) | 0.00590 (1.38) |
| inflation | -0.332 (-0.67) | -0.557 (-1.03) | -1.477 (-1.66) | -1.470 (-1.58) |
| gov | -0.0165 (-0.32) | -0.0625 (-1.30) | -0.0890 (-1.55) | -0.126** (-2.14) |
| fdi | 0.000946 (1.41) | 0.00108 (1.42) | 0.000779 (1.35) | 0.000798 (1.26) |
| constant | 0.137*** (3.03) | 0.103** (2.41) | 0.0261 (0.72) | -0.0198 (-0.43) |
| Observations | 60 | 55 | 60 | 55 |
| OID | | | [0.211] | [0.298] |
| Endog | | [0.223] | [0.169] | [0.253] |
| Adjusted R^2 | 0.513 | 0.442 | 0.154 | -0.130 |
| F | 4.940 | 4.688 | 45.46 | 10.92 |

Note: The alternative measure of status preference is the averaged fraction of respondents who selected both *thrift saving money and things* and *hard work* as important qualities of each country. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The t-statistics, in parentheses, are based on standard errors clustered by country in Regression (1). The t-statistics, in parentheses, are based on robust standard errors with small sample in Regression (2), (3) and (4). OID represents the Hansen's J test of overidentification. Endog stands for the GMM C chi-2 test of endogeneity. The corresponding p-values are in square brackets.

In Regression (2) the measure of patent protection is assumed to be endogenous, so the instrumented variables are *ipr* and *spv*×*ipr*, and the instrument variables are *ipr_pre* and *spv*×*ipr_pre*. In Regression (3) the measure of status preference is assumed to be endogenous, so the instrumented variables are *spv*×*ipr* and *spv*, and the instrument variables are dummy variables of country religious denomination and their interaction terms with *ipr*. In Regression (4) both measures of patent protection and status preference are assumed to be endogenous. The instrumented variables are *ipr*, *spv*×*ipr* and *spv*, and the instrument variables are *ipr_pre*, dummy variables of country religious denominations and the interaction terms between the dummy variables and *ipr_pre*. Due to missing data on average degree of patent protection between 1960 and 1979, the samples of Bulgaria, China, Hungary, Poland and Romania are dropped in Regression (2) and (4).

Table VII Sensitivity Analysis 2:
Alternative Measure of Status Preference II

| | (1) | (2) | (3) | (4) |
|------------------|-----------------------|------------------------|-----------------------|------------------------|
| | OLS | GMM | GMM | GMM |
| ly0 | -0.0103*** (-4.20) | -0.00956*** (-4.60) | -0.0106*** (-5.85) | -0.00699*** (-5.30) |
| lki | 0.0282*** (3.48) | 0.0186** (2.17) | 0.0345*** (7.02) | 0.0195*** (2.77) |
| ledu | 0.00570* (1.90) | 0.00298 (1.00) | 0.00624** (2.29) | 0.00274 (1.24) |
| pop | -0.631** (-2.24) | -0.715** (-2.71) | -0.615*** (-3.06) | -0.559** (-2.71) |
| ipr ² | -0.00423* (-1.76) | -0.00254 (-0.67) | -0.00474** (-2.61) | -0.00399** (-2.11) |
| ipr | 0.0486** (2.20) | 0.0385 (1.05) | 0.0646*** (2.76) | 0.0687** (2.50) |
| spv × ipr | -0.0345* (-1.91) | -0.0267 (-1.11) | -0.0535** (-2.71) | -0.0583** (-2.58) |
| spv | 0.110* (1.75) | 0.118 (1.50) | 0.159* (1.96) | 0.216** (2.26) |
| trade | 0.000824 (0.15) | 0.000221 (0.04) | -0.000140 (-0.03) | 0.00373 (0.85) |
| inflation | 0.609 (0.98) | 0.609 (1.02) | 0.813* (1.76) | 1.074** (2.46) |
| gov | 0.0458 (0.98) | -0.00404 (-0.08) | 0.0725** (2.11) | 0.00803 (0.20) |
| fdi | 0.000867 (1.09) | 0.00238** (2.22) | 0.000965* (1.81) | 0.00175* (1.75) |
| constant | 0.0221 (0.31) | -0.00246 (-0.03) | -0.0136 (-0.16) | -0.124 (-1.29) |
| Observations | 47 | 42 | 47 | 42 |
| OID | | | [0.305] | [0.116] |
| Endog | | [0.658] | [0.023] | [0.490] |
| Adjusted R^2 | 0.531 | 0.483 | 0.491 | 0.334 |
| F | 5.038 | 11.54 | 24.21 | 83.50 |

Note: The alternative measure of status preference is the averaged fraction of respondents who strongly agree or agree with the view “people who don’t work turn lazy” in each country. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The t-statistics, in parentheses, are based on standard errors clustered by country in Regression (1). The t-statistics, in parentheses, are based on robust standard errors with small sample in Regression (2), (3) and (4). OID represents the Hansen’s J test of overidentification. Endog stands for the GMM C chi-2 test of endogeneity. The corresponding p-values are in square brackets.

In Regression (2) the measure of patent protection is assumed to be endogenous, so the instrumented variables are ipr and $\text{spv} \times \text{ipr}$, and the instrument variables are ipr_pre and $\text{spv} \times \text{ipr_pre}$. In Regression (3) the measure of status preference is assumed to be endogenous, so the instrumented variables are $\text{spv} \times \text{ipr}$ and spv , and the instrument variables are dummy variables of country religious denomination and their interaction terms with ipr . In Regression (4) both measures of patent protection and status preference are assumed to be endogenous. The instrumented variables are ipr , $\text{spv} \times \text{ipr}$ and spv , and the instrument variables are ipr_pre , dummy variables of country religious denominations and the interaction terms between the dummy variables and ipr_pre . Due to missing data on average degree of patent protection between 1960 and 1979, the samples of Bulgaria, China, Hungary, Poland and Romania are dropped in Regression (2) and (4).

Table VIII Sensitivity Analysis 3:
Regressions on Subsamples (OLS)

| | (1) | (2) | (3) | (4) |
|------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | OLS | OLS | OLS | OLS |
| ly0 | -0.0108*** (-4.51) | -0.0117*** (-3.82) | -0.0136*** (-4.06) | -0.0162*** (-5.18) |
| lki | 0.0345*** (5.33) | 0.0176** (2.06) | 0.0129 (1.50) | 0.0131* (1.73) |
| ledu | 0.00613** (2.40) | 0.00691** (2.14) | 0.0121** (2.64) | 0.0124*** (3.77) |
| pop | -0.428** (-2.31) | -0.461* (-1.78) | -0.739** (-2.40) | -0.967*** (-2.91) |
| ipr ² | -0.000719 (-0.53) | -0.00136 (-0.78) | -0.00183 (-0.93) | -0.00275 (-1.17) |
| ipr | 0.0116 (1.16) | 0.0192 (1.44) | 0.0183 (1.16) | 0.0234 (1.35) |
| spv × ipr | -0.0173 (-1.40) | -0.0262* (-1.85) | -0.0218 (-1.47) | -0.0171 (-0.95) |
| spv | 0.0408 (1.08) | 0.0867* (1.91) | 0.0684 (1.44) | 0.0326 (0.58) |
| trade | 0.00342 (0.77) | -0.000708 (-0.12) | 0.00377 (0.50) | -0.0103* (-1.87) |
| inflation | 0.171 (0.40) | -0.589 (-1.04) | -0.469 (-0.91) | -1.176 (-1.47) |
| gov | 0.0633 (1.39) | -0.0199 (-0.35) | 0.0208 (0.32) | 0.0929 (1.46) |
| fdi | 0.0000835 (0.16) | 0.00117 (1.63) | 0.000577 (0.65) | -0.000305 (-0.39) |
| constant | 0.134*** (3.13) | 0.122** (2.36) | 0.134** (2.61) | 0.186*** (4.35) |
| Observations | 53 | 57 | 52 | 39 |
| Adjusted R^2 | 0.675 | 0.501 | 0.526 | 0.674 |
| F | 12.81 | 4.920 | 4.630 | 6.213 |

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The t-statistics, in parentheses, are based on standard errors clustered by country.

Regression (1) omits countries from Middle East & North Africa. Regression (2) omits countries from South Asia. Regression (3) excludes sub-Saharan countries. Regression (4) is based on the countries with at least two observations of status preference values.

Table IX Sensitivity Analysis 4: Regressions on Subsamples
(Instrumented: Patent Protection)

| | (1) | (2) | (3) | (4) |
|------------------|------------------------|------------------------|-----------------------|-----------------------|
| | GMM | GMM | GMM | GMM |
| ly0 | -0.00927*** (-3.97) | -0.00909*** (-3.30) | -0.0113*** (-3.41) | -0.0116*** (-3.61) |
| lki | 0.0271*** (4.55) | 0.00751 (0.98) | 0.00708 (0.88) | 0.00980 (1.13) |
| ledu | 0.00429 (1.67) | 0.00403 (1.29) | 0.0109** (2.12) | 0.00991 (1.65) |
| pop | -0.452** (-2.12) | -0.324 (-1.08) | -0.890** (-2.69) | -1.258*** (-3.26) |
| ipr ² | -0.00211 (-0.97) | -0.00317 (-1.27) | -0.000692 (-0.41) | -0.000466 (-0.20) |
| ipr | 0.0216 (1.38) | 0.0362* (1.87) | 0.0119 (0.82) | 0.00860 (0.52) |
| spv × ipr | -0.0210** (-2.07) | -0.0395** (-2.70) | -0.0270** (-2.31) | -0.0252 (-1.45) |
| spv | 0.0618* (2.01) | 0.133*** (2.92) | 0.0852** (2.26) | 0.0710 (1.11) |
| trade | 0.00294 (0.61) | 0.000787 (0.15) | 0.00681 (0.93) | -0.00403 (-0.72) |
| inflation | 0.0889 (0.23) | -0.987 (-1.37) | -0.514 (-0.85) | -1.411 (-1.32) |
| gov | 0.0352 (0.85) | -0.0673 (-1.13) | -0.0161 (-0.28) | 0.0305 (0.52) |
| fdi | 0.000453 (0.61) | 0.00136* (1.69) | 0.000602 (0.55) | 0.00122 (0.66) |
| constant | 0.0945** (2.18) | 0.0630 (1.48) | 0.118*** (2.85) | 0.169*** (4.01) |
| Observations | 48 | 52 | 47 | 34 |
| OID | | | | |
| Endog | [0.299] | [0.088] | [0.103] | [0.094] |
| Adjusted R^2 | 0.601 | 0.389 | 0.446 | 0.514 |
| F | 11.16 | 4.629 | 5.904 | 10.01 |

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The t-statistics, in parentheses, are based on robust standard errors with a small sample. OID represents the Hansen's J test of overidentification. Endog stands for the GMM C chi-2 test of endogeneity. The corresponding p-values are in square brackets.

In this table, the measure of patent protection is assumed to be endogenous, so the instrumented variables are ipr and $\text{spv} \times \text{ipr}$, and the instrument variables are ipr_pre and $\text{spv} \times \text{ipr_pre}$. Due to missing data on average degree of patent protection between 1960 and 1979, the samples of Bulgaria, China, Hungary, Poland and Romania are dropped. Regression (1) omits countries from Middle East & North Africa. Regression (2) omits countries from South Asia. Regression (3) excludes sub-Saharan countries. Regression (4) is based on the countries with at least two observations of status preference values.

Table X Sensitivity Analysis 5: Regressions on Subsamples
(Instrumented: Status Preference)

| | (1) | (2) | (3) | (4) |
|------------------|------------------------|-----------------------|------------------------|-----------------------|
| | GMM | GMM | GMM | GMM |
| ly0 | -0.00880*** (-3.38) | -0.00764** (-2.29) | -0.00986*** (-3.14) | -0.00743 (-1.57) |
| lki | 0.0284*** (3.86) | 0.00469 (0.56) | 0.00555 (0.74) | 0.00462 (0.49) |
| ledu | 0.00711*** (3.05) | 0.0108*** (2.71) | 0.0119** (2.68) | 0.0124*** (3.39) |
| pop | -0.324 (-1.41) | 0.125 (0.32) | -0.517* (-2.00) | -0.917*** (-3.32) |
| ipr ² | -0.00244 (-1.66) | -0.00359** (-2.17) | -0.00386** (-2.68) | -0.00685** (-2.43) |
| ipr | 0.0226** (2.04) | 0.0413*** (2.84) | 0.0407*** (3.26) | 0.0585*** (2.87) |
| spv × ipr | -0.0191* (-1.77) | -0.0541** (-2.33) | -0.0524*** (-2.94) | -0.0635** (-2.56) |
| spv | 0.0835** (2.24) | 0.244*** (3.06) | 0.189*** (3.38) | 0.235** (2.51) |
| trade | -0.00175 (-0.41) | -0.00956 (-1.59) | -0.00133 (-0.25) | -0.00821 (-1.28) |
| inflation | 0.0215 (0.05) | -1.588** (-2.13) | -1.134 (-1.44) | -3.539** (-2.38) |
| gov | 0.0687 (1.68) | -0.0158 (-0.33) | 0.0246 (0.57) | 0.0857 (1.15) |
| fdi | 0.000814 (1.18) | 0.00253*** (2.73) | 0.00124* (1.90) | 0.000424 (0.42) |
| constant | 0.0813 (1.68) | 0.0197 (0.35) | 0.0519 (1.27) | 0.0802 (1.40) |
| Observations | 53 | 57 | 52 | 39 |
| OID | [0.251] | [0.235] | [0.278] | [0.764] |
| Endog | [0.244] | [0.030] | [0.041] | [0.076] |
| Adjusted R^2 | 0.584 | 0.152 | 0.392 | 0.388 |
| F | 17.04 | 5.564 | 262.2 | 10.57 |

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The t-statistics, in parentheses, are based on robust standard errors with a small sample. OID represents the Hansen's J test of overidentification. Endog stands for the GMM C chi-2 test of endogeneity. The corresponding p-values are in square brackets.

In this table the measure of status preference is assumed to be endogenous. The instrumented variables are $spv \times ipr$ and spv , and the instrument variables are dummy variables of country religious denominations and their interaction terms with ipr . Regression (1) omits countries from Middle East & North Africa. Regression (2) omits countries from South Asia. Regression (3) excludes sub-Saharan countries. Regression (4) is based on the countries with at least two observations of status preference values.

Table XI Sensitivity Analysis 6: Regressions on Subsamples
(Instrumented: Both)

| | (1) | (2) | (3) | (4) |
|------------------|------------------------|-----------------------|----------------------|---------------------|
| | GMM | GMM | GMM | GMM |
| ly0 | -0.00856*** (-3.25) | -0.00486 (-1.47) | -0.0103** (-2.62) | -0.00252 (-0.39) |
| lki | 0.0226*** (2.86) | -0.00396 (-0.42) | -0.000195 (-0.02) | 0.00625 (0.61) |
| ledu | 0.00436* (1.75) | 0.00437 (1.32) | 0.00623 (1.21) | 0.000602 (0.09) |
| pop | -0.239 (-0.99) | 0.678 (1.67) | 0.0897 (0.21) | -0.693** (-2.13) |
| ipr ² | -0.00273 (-1.18) | -0.00760** (-2.25) | -0.00388* (-1.80) | -0.00151 (-0.50) |
| ipr | 0.0281 (1.42) | 0.0658** (2.52) | 0.0361* (1.82) | 0.0174 (0.76) |
| spv × ipr | -0.0221 (-1.26) | -0.0365* (-1.80) | -0.0167 (-0.71) | -0.0229 (-0.74) |
| spv | 0.0985* (1.73) | 0.199*** (3.64) | 0.109 (1.66) | 0.148 (1.32) |
| trade | -0.00625 (-1.04) | -0.00972 (-1.58) | -0.00377 (-0.66) | -0.00885 (-1.26) |
| inflation | -0.237 (-0.55) | -1.885* (-1.94) | -1.355* (-1.88) | -2.544 (-1.56) |
| gov | 0.0445 (1.21) | -0.0763 (-1.19) | -0.0348 (-0.61) | 0.0298 (0.46) |
| fdi | 0.00204** (2.11) | 0.00309*** (3.02) | 0.00228** (2.40) | 0.00422* (1.98) |
| constant | 0.0638 (1.13) | -0.0459 (-0.81) | 0.0577 (1.11) | 0.0677 (0.91) |
| Observations | 48 | 52 | 47 | 34 |
| OID | [0.123] | [0.332] | [0.335] | [0.606] |
| Endog | [0.646] | [0.155] | [0.124] | [0.440] |
| Adjusted R^2 | 0.460 | -0.234 | 0.155 | 0.014 |
| F | 35.79 | 22.47 | 15.01 | 17.99 |

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The t-statistics, in parentheses, are based on robust standard errors with a small sample. OID represents the Hansen's J test of overidentification. Endog stands for the GMM C chi-2 test of endogeneity. The corresponding p-values are in square brackets.

In this table both measures of patent protection and status preference are assumed to be endogenous. The instrumented variables are ipr , $spv \times ipr$ and spv , and the instrument variables are ipr_pre , dummy variables of country religious denominations and the interaction terms between the dummy variables and ipr_pre . Due to missing data on average degree of patent protection between 1960 and 1979, the samples of Bulgaria, China, Hungary, Poland and Romania are dropped. Regression (1) omits countries from Middle East & North Africa. Regression (2) omits countries from South Asia. Regression (3) excludes sub-Saharan countries. Regression (4) is based on the countries with at least two observations of status preference values.

Part B: Extensions of the Theoretical Model

B.1 Absolute Wealth Preference

Suppose the utility function is

$$U_i(t) = \int_0^\infty u_i[c_i(t), a_i(t)] e^{-\rho t} dt = \int_0^\infty \frac{\{[c_i(t)]^\mu [a_i(t)]^\nu\}^{1-\gamma} - 1}{1-\gamma} e^{-\rho t} dt, \quad (\text{A1})$$

where we assume $1 - (\mu + \nu)(1 - \gamma) > 0$. This condition ensures that the elasticities of intertemporal substitution of consumption and holding assets are both positive. The maximization of (A1) subject to the budget constraint in the paper results in the following Euler equation along the balanced growth path:

$$\begin{aligned} \frac{\dot{c}_i}{c_i} &= \frac{1}{1 - (\mu + \nu)(1 - \gamma)} \left[\frac{\partial u_i / \partial a_i}{\partial u_i / \partial c_i} + (r - \rho) \right] \\ &= \frac{1}{1 - (\mu + \nu)(1 - \gamma)} \left[\frac{\nu c_i}{\mu a_i} + (r - \rho) \right] = \frac{\theta c_i / a_i + (r - \rho)}{1 - (\mu + \nu)(1 - \gamma)}. \end{aligned} \quad (\text{A2})$$

The transversality condition implies that $\rho - g(\mu + \nu)(1 - \gamma) > 0$. The Euler equation is exactly the same as that in the paper except for the parameter difference in the denominator.

Moreover, the expression of social welfare in this case is

$$\begin{aligned} \tilde{S} &= L \cdot U \\ &= \frac{N(0)^{(\mu+\nu)(1-\gamma)} L^{1-(\mu+\nu)(1-\gamma)} \eta^{\nu(1-\gamma)} \tilde{W}}{1-\gamma} - \frac{L}{\rho(1-\gamma)}, \end{aligned} \quad (\text{A3})$$

where $\tilde{W} = \frac{[(\frac{1-\alpha}{B})^{1/\alpha} \frac{L(B+\alpha-1)}{1-\alpha} - g\eta]^\mu}{\rho - g(\mu+\nu)(1-\gamma)}$. This is also in the same form as the social welfare in the paper, if one ignores the constant term $\eta^{\nu(1-\gamma)}$ and regards $\mu + \nu$ as one constant. Since the other model settings remain unchanged, our main results still hold when the utility function depends upon absolute level of wealth.

B.2 Finite Patent Length

A patent system with a finite length requires that in each period some early-created innovations expire. Denote the patent length as T . At time t , intermediate good $j \in [N_{t-T}, N_t]$ has monopoly rights, while intermediate good $j \in [0, N_{t-T}]$ are produced competitively. Thus we have

$$\chi_j = \begin{cases} B, & j \in [N_{t-T}, N_t] \\ 1, & j \in [0, N_{t-T}] \end{cases}. \quad (\text{A4})$$

The profit function of the firm producing intermediate good j is

$$\pi_j = \begin{cases} (B-1) \left(\frac{1-\alpha}{B}\right)^{1/\alpha} L, & j \in [N_{t-T}, N_t] \\ 0, & j \in [0, N_{t-T}] \end{cases}. \quad (\text{A5})$$

In equilibrium the patent value is given by

$$P(t) = \int_t^{t+T} e^{-\int_t^\tau r(s)ds} \pi(\tau) d\tau = (B-1) \left(\frac{1-\alpha}{B}\right)^{1/\alpha} L \frac{1-e^{-rT}}{r}. \quad (\text{A6})$$

Combining (A6) and the equilibrium condition $P(t) = \eta$, we reveal

$$\eta = (B-1) \left(\frac{1-\alpha}{B}\right)^{1/\alpha} L \frac{1-e^{-rT}}{r}. \quad (\text{A7})$$

Using some algebra, the partial derivative of r with respect to B is

$$\begin{aligned} \frac{\partial r}{\partial B} &= \frac{[(1-\alpha)/B]^{1/\alpha} [1 - (1-\alpha)B] L (1-e^{-rT}) / (\alpha B \eta)}{1 - [(1-\alpha)/B]^{1/\alpha} (B-1) e^{-rT} T L / \eta} \\ &= \frac{1 - (1-\alpha)B}{\alpha B (B-1)} \cdot \frac{(e^{rT} - 1)r}{e^{rT} - 1 - rT}. \end{aligned} \quad (\text{A8})$$

Since $e^{rT} - 1 - rT > 0$, $e^{rT} - 1 > 0$ when $rT > 0$, we obtain that $\frac{\partial r}{\partial B} > 0$ holds on $B \in (1, \frac{1}{1-\alpha})$. Moreover, a simple calculation yields $\partial r / \partial B|_{B=1} = +\infty$ and $\partial r / \partial B|_{B=1/(1-\alpha)} = 0$.

In equilibrium, the resource constraint is

$$\begin{aligned} cL &= Y - \int_0^N k_j dj - \dot{N}\eta \\ &= N \left[\alpha(1-\alpha)^{(1-\alpha)/\alpha} e^{-gT} L + \left(\frac{1-\alpha}{B} \right)^{1/\alpha} \frac{B+\alpha-1}{1-\alpha} (1-e^{-gT}) L - g\eta \right] \end{aligned} \quad (\text{A9})$$

Additionally, the total assets owned by households are

$$aL = \int_{N_{t-T}}^{N_t} P dj = \eta N (1 - e^{-gT}). \quad (\text{A10})$$

Thus, the ratio of consumption to assets is

$$\frac{c}{a} = \frac{(1-\alpha)^{(1-\alpha)/\alpha} L [\alpha e^{-gT} + (B+\alpha-1)(1-e^{-gT})/B^{1/\alpha}] - g\eta}{(1-e^{-gT})\eta}. \quad (\text{A11})$$

Differentiating (A11) with respect to B , we find

$$\frac{\partial(\theta c/a)}{\partial B} = -\theta \left(\frac{1-\alpha}{B} \right)^{1/\alpha} \frac{(B-1)L}{\alpha \eta B}. \quad (\text{A12})$$

As a consequence, we have $\frac{\partial(\theta c/a)}{\partial B} \leq 0$, $\frac{\partial(\theta c/a)}{\partial B}|_{B=1} = 0$, and $\frac{\partial(\theta c/a)}{\partial B}|_{B=1/(1-\alpha)} = -\theta(1-\alpha)^{2/\alpha} L/\eta$.

To simplify the notation, we assume agents have preference for relative wealth in this case. So the equilibrium growth rate is

$$g = \frac{\dot{N}}{N} = \frac{\dot{c}}{c} = \frac{\theta c/a + r - \rho}{1 - \mu(1 - \gamma)}. \quad (\text{A13})$$

Its partial derivative with respect to B is:

$$\frac{\partial g}{\partial B} = \frac{\partial(\theta c/a)/\partial B + \partial r/\partial B}{1 - \mu(1 - \gamma) - \partial(\theta c/a)/\partial g}. \quad (\text{A14})$$

Since $\alpha - (B+\alpha-1)/B^{1/\alpha} > 0$ for $B \in (1, \frac{1}{1-\alpha})$, we have $\partial(\theta c/a)/\partial g < 0$. Combining

this with (A8) and (A12), it is easy to show that $\frac{\partial g}{\partial B}|_{B=1} > 0$ and $\frac{\partial g}{\partial B}|_{B=1/(1-\alpha)} < 0$. Thus the relationship between patent breadth and innovation is non-monotonic, which follows Proposition 1 in the paper.

Denote the growth-rate-maximizing degree of patent breadth as B^* . Using (A8), (A12) and (A14), we know that B^* satisfies

$$\frac{1 - (1 - \alpha)B^*}{(B^* - 1)} = \frac{\theta e^{rT}(e^{rT} - 1 - rT)}{(e^{rT} - 1)^2}. \quad (\text{A15})$$

This is followed by

$$\left\{ \frac{-\alpha}{(B^* - 1)^2} - \frac{\theta T e^{rT} [2 + rT + (rT - 2)e^{rT}]}{(e^{rT} - 1)^3} \frac{\partial r}{\partial B^*} \right\} \frac{\partial B^*}{\partial \theta} = \frac{e^{rT}(e^{rT} - 1 - rT)}{(e^{rT} - 1)^2}. \quad (\text{A16})$$

Since $\frac{\partial r}{\partial B^*} > 0$ and $e^{rT} > 1 + rT$, we get $\frac{\partial B^*}{\partial \theta} < 0$. This is also the same as Proposition 2.

Moreover, the differentiation of (A13) with respect to θ shows

$$\frac{\partial g}{\partial \theta} = \frac{c/a}{1 - \mu(1 - \gamma) - \partial(\theta c/a)/\partial g} > 0. \quad (\text{A17})$$

So the result of Proposition 3 remains.

Following the previous analysis, the welfare function in this case is

$$S = L \cdot U = \frac{N(0)^{\mu(1-\gamma)} L^{1-\mu(1-\gamma)} \phi^{\mu(1-\gamma)}}{(1-\gamma)[\rho - g\mu(1-\gamma)]} - \frac{L}{\rho(1-\gamma)}, \quad (\text{A18})$$

where $\phi = \alpha(1-\alpha)^{(1-\alpha)/\alpha} e^{-gT} L + (\frac{1-\alpha}{B})^{1/\alpha} \frac{B+\alpha-1}{1-\alpha} (1 - e^{-gT}) L - g\eta$. Taking differentiation of S with respect to B , we obtain

$$\begin{aligned} \frac{dS}{dB}|_{B=1} &= \frac{\mu N(0)^{\mu(1-\gamma)} L^{1-\mu(1-\gamma)} \phi^{\mu(1-\gamma)-1}}{[\rho - g\mu(1-\gamma)]^2} \\ &\quad \cdot \{ \alpha(1-\alpha)^{(1-\alpha)/\alpha} L - \rho\eta - g\eta [1 - \mu(1-\gamma)] \} \frac{\partial g}{\partial B}, \end{aligned} \quad (\text{A19})$$

and

$$\begin{aligned} \frac{dS}{dB} \Big|_{B=1/(1-\alpha)} &= \frac{\mu N(0)^{\mu(1-\gamma)} L^{1-\mu(1-\gamma)} \phi^{\mu(1-\gamma)-1}}{[\rho - g\mu(1-\gamma)]^2} \\ &\cdot \left\{ \left[\frac{\partial \phi}{\partial B} + \frac{\partial \phi}{\partial g} \frac{\partial g}{\partial B} \right] [\rho - g\mu(1-\gamma)] + \phi \frac{\partial g}{\partial B} \right\} \Big|_{B=1/(1-\alpha)}. \end{aligned} \quad (\text{A20})$$

Equation (A11) and (A14) imply that $\frac{\partial \phi}{\partial B} + \frac{\partial \phi}{\partial g} \frac{\partial g}{\partial B} < 0$, so we have $\frac{dS}{dB} \Big|_{B=1/(1-\alpha)} < 0$. Moreover, since $\frac{\partial g}{\partial B} \Big|_{B=1} > 0$, we get that $\frac{dS}{dB} \Big|_{B=1} > 0$ if $g < \tilde{g}$ and $\frac{dS}{dB} \Big|_{B=1} < 0$ if $g > \tilde{g}$, where

$$\tilde{g} = \frac{\alpha(1-\alpha)^{(1-\alpha)/\alpha} L - \rho\eta}{\eta[1-\mu(1-\gamma)]}. \quad (\text{A21})$$

Combining (A7), (A11) and (A13), we get that when $B = 1$, the equilibrium growth rate satisfies the following condition:

$$\theta = \frac{[1-\mu(1-\gamma)]g + \rho}{\alpha(1-\alpha)^{(1-\alpha)/\alpha} L - g\eta} (1 - e^{-gT}) \eta \triangleq \tilde{\theta}(g). \quad (\text{A22})$$

It is easy to show that the right-hand side of (A22) increases in g . If we denote the right-hand side of (A22) as $\tilde{\theta}(g)$, then equation (A19) and (A21) imply that $\frac{dS}{dB} \Big|_{B=1} > 0$ when $\theta < \tilde{\theta}(\tilde{g})$ and $\frac{dS}{dB} \Big|_{B=1} < 0$ when $\theta > \tilde{\theta}(\tilde{g})$. These results are similar to those in the basic model.