Nombre: Natalia Opazo



## "2do Control MGR 622. "Evaluación de recursos acuáticos" Diplomado en Evaluación de Recursos Pesqueros

1. Identifique una pesquería/recurso de su interés y genere una tabla con los parámetros biológico/pesqueros relevantes. Si realiza cálculos intermedios y/o supuestos debe indicarlos/explicarlos/justificarlos brevemente (5 puntos).

Parámetros biológicos/pesqueros Merluza común

| Tatametros biológicos pesqueros Pierraza coman |         |           |                                   |  |  |  |  |  |  |
|--|---------|-----------|-----------------------------------|--|--|--|--|--|--|
| Parámetro                                      | Símbolo | Valor     | Cita                              |  |  |  |  |  |  |
| Mortalidad natural                             | M       | 0.33      | Payá (2005); Canales (2008)       |  |  |  |  |  |  |
| Número de edades                               | Tmax    | 12        | Tascheri (2023) (Informe técnico) |  |  |  |  |  |  |
| Edad reclutamiento al $50\%$                   | A50 %   | 2.4       | Tascheri (2023) (Informe técnico) |  |  |  |  |  |  |
| Edad reclutamiento al $95\%$                   | A95 %   | 3         | Tascheri (2023) (Informe técnico) |  |  |  |  |  |  |
| Reclutamiento                                  | R0      | 1         | Caso prueba (para testear)        |  |  |  |  |  |  |
| Mes del año de desove (en fracción)            | dts     | 0.5833    | Tascheri (2023) (Informe técnico) |  |  |  |  |  |  |
|  |         |           | (Máximo peak reproductivilidad)   |  |  |  |  |  |  |
| Talla máxima (ec. von Bertalanffy)             | Loo     | 80.4 (cm) | Aguayo and Ojeda (1987)           |  |  |  |  |  |  |
|  |         |           | (sexos combinados)                |  |  |  |  |  |  |
| Parámetro de crecimiento (ec. von Bertalanffy) | k       | 0.14      | Aguayo and Ojeda (1987)           |  |  |  |  |  |  |
|  |         |           | (sexos combinados)                |  |  |  |  |  |  |
| 1era edad (ec. von Bertalanffy)                | to      | -0.918    | Aguayo and Ojeda (1987)           |  |  |  |  |  |  |
|  |         |           | (sexos combinados)                |  |  |  |  |  |  |
| Parámetro relación peso/talla                  | aw      | 0.001     | Se asume (no es importante        |  |  |  |  |  |  |
|  |         |           | por que estamos viendos           |  |  |  |  |  |  |
|  |         |           | los valores en escala relativa)   |  |  |  |  |  |  |
| Potencia relación peso/talla                   | bw      | 3         | Se asume (para testear)           |  |  |  |  |  |  |
| Edad primera madurez                           | A50m    | 2.8       | Lillo (2017)                      |  |  |  |  |  |  |
| Edad de reproducción del 95 % de la especie    | A95m    | 3.5       | Lillo (2017)                      |  |  |  |  |  |  |
| steepness                                      | h       | 0.65      | Tascheri (2023) (Informe técnico) |  |  |  |  |  |  |

## Considerando un modelo edad-estructurado (con un h=0.65) determine:

**2**. Los niveles de mortalidad por pesca límite F20%B0 (agotamiento) y objetivo F40%B0. Explique (10 puntos)

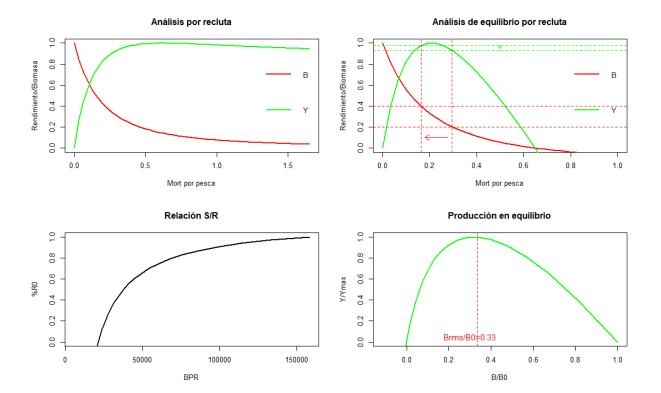


Figura 1: El siguiente panel nos muestra cuatro gráficas para un steepness de 1 y 0.65, sin y con relación stock recluta, respectivamente: a) Análisis por recluta (sin efecto de la reducción de biomasa en el reclutamiento, R0 constante), la línea roja corresponde a la biomasa y la verde al rendimiento; b) muestra el análisis de equilibrio por recluta (con reclutamiento afectado por la reducción de biomasa, RO variable), la línea roja corresponde a la biomasa en equilibrio y la verde al rendimiento en equilibrio; c) Relación stock-recluta para la biomasa en equilibrio y d) producción en equilibrio.

Según lo que podemos apreciar con las líneas segmentadas de la figura 1b) el valor de la mortalidad por pesca (F) cuando dejamos un 20 % de la biomasa desovante  $(F20\,\%B0)$  es 0.295. Mientras, cuando dejamos un 40 %B0 es 0.165. Lo anterior se explica porque a menor tasa de explotación (F menor) debiesemos esperar una mayor sobrevivencia de los organismos.

- 3. El nivel de reducción/agotamiento poblacional (%B0) si la mortalidad por pesca para la pesquería se encuentra en F=2.5M. ¿Cuál es el diagnóstico de la población? (10 puntos).
  - Cuando h=1:
    - B0 (cuando F es 0) = 158350
    - B (cuando F es 2.5M) = 15643

El nivel de agotamiento es:

$$NV = \frac{B(F = 2.5M)}{B(F = 0)} = \frac{15643}{158350} = 0.09$$
 (1)

Es decir, el nivel de agotamiento se alcanza cuando la biomasa se encuentra en un  $9\,\%$  de su biomasa desovante.

- Cuando h = 0.65
  - B0 (cuando F es 0) = 158350
  - B (cuando F es 2.5M) = 0

El nivel de agotamiento es:

$$NV = \frac{B(F=2.5M)}{B(F=0)} = \frac{0}{158350} = 0$$
 (2)

La biomasa del stock se exingue.

- 4. ¿En cuánto se debe reducir el esfuerzo de pesca para recuperar la población al objetivo de manejo? ¿Cuál es el efecto en el rendimiento de pesca de largo plazo para la pesquería actual? Comente (10 puntos)
  - Para F=0.295 (20 %B0)

Si el objetivo de manejo es mantener la población en un 40% de la biomasa desovante (40%B0) entonces se debe reducir el esfuerzo de pesca en aproximadamente un 45% (0.13). El efecto es un ligero 4.6% de aumento en el rendimiento de pesca (de 0.931 a 0.975).

■ Para F=2.5M

Para alcanzar el objetivo de manejo debemos reducir la mortalidad por pesca en un 80%, dado que nos encontramos en una situación donde el recurso se extinguió. El rendimiento en este caso aumentaría un 98%.

5. La edad y longitud de selectividad (a/L50, A/L95) factible que permita recuperar la población al objetivo de manejo sin alterar el nivel del esfuerzo de pesca. Comente (10 puntos)

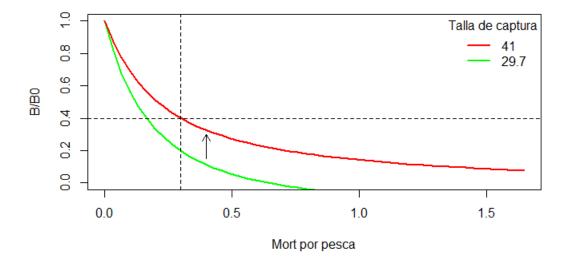


Figura 2: Proporción de sobrevivencia en biomasa en función de la mortalidad por pesca (F). La línea roja es para una talla de 41 cm y la roja para una talla de 29.7 cm, los puntos segmentados negros se intersectan en el objetivo de manejo pesquero (40 %B0).

La única forma de manejar un esfuerzo de pesca ya instalado es cambiando la talla mínima legal.

Ejemplo:

• Si pasamos de A50 = 2.4 a A50 = 4.2

Aplicando la ec. de crecimiento de von Bertalanffy:

$$L = Loo * (1 - exp^{(-k*(edad - t0))})$$
(3)

Tenemos que L1(2.4) = 29.7 cm y L2(4.2) = 41 cm. Como podemos ver, en la imagen 2 esto resultará en una mejora de la biomasa del stock, permitiendo alcanzar el objetivo de manejo (40%B0) sin recurrir a un disminución del esfuerzo de pesca.

## Referencias

Aguayo, M. and Ojeda, V. (1987). Estudios de la edad y crecimiento de merluza común (merluccius gayi gayi guichenot, 1848)(gadiformes-merlucciidae). *Invest. Pesq., Chile*, 34:99–112.

Canales, C. P. Gálvez, C. M. y. S. S. (2008). Investigación evaluación de stock y ctp merluza común, 2008. informe final proyecto bip n°30066300-0. ifop-subpesca. page 56.

Lillo, S., J. L. J. O. J. C. S. E. M. E. D. M. R. J. A. V. V. S. N. R. L. (2017). Convenio de desempeño 2016: Evaluación directa de merluza común, 2016. informe final. instituto de fomento pesquero. page 115. + Figuras, Tablas y Anexos.

Payá, I. (2005). Investigación ctp merluza común, 2005, fase ii. instituto de fomento pesquero. page 39.

Tascheri, R. (2023). Segundo informe tÉcnico corregido convenio de desempeño 2022 estatus y posibilidades de explotación biológicamente sustentables de los principales recursos pesqueros nacionales:.

## Anexos

Cuadro 1: La siguiente tabla contiene: F (mortalidad por pesca), BPR (biomasa), YPR (rendimiento), BPReq (biomasa en equilibrio), YPReq (rendimiento en equilibrio), pBO (proporción biomasa respecto de la desovante), pB0eq (proporción biomasa respecto de la desovante en equilibrio).

| 1   |    |       |            |           |             |             |            |              |
|---|----|-------|------------|-----------|-------------|-------------|------------|--------------|
| 2         0.033         133495.573         4742.603         129629.2165         4665.2460         0.84303735         0.818620940           3         0.066         114027.943         8177.331         107133.2883         7858.8922         0.62213238         0.653352970           5         0.132         85966.633         12511.514         74706.8863         10924.9207         0.4228574         0.471781155           6         0.165         75680.689         13974.386         62820.9067         11599.8360         0.42403426         0.338462701           7         0.198         67149.298         15032.956         52962.4100         11586.8660         0.42403426         0.33872053           8         0.231         59997.899         15858.881         44698.5715         11797.7673         0.37889249         0.228275768           10         0.227         48779.318         16912.395         31734.8775         11495.4270         0.34067258         0.238110538           11         0.330         44334.013         17735.157         22146.3673         8726.3455         0.2244006         0.139386435           12         0.363         34081.5249         17873.156         18262.6731         8726.3455         0.225791373         0.167969648  |    | F     | BPR        | YPR       | _           | _           | pB0        |              |
| 3         0.066         1.14027.943         8177.331         10713.2883         7682.8922         0.72009740         0.676556994           4         0.099         98515.111         10699.125         89207.3133         9688.2657         0.62213238         0.636352970           5         0.132         85966.633         13974.386         62820.9067         11599.8360         0.4773982         0.337462701           6         0.165         75680.689         13974.386         62820.9067         11599.8360         0.4773982         0.334402701           7         0.188         67149.298         15032.956         5296.4100         1156.8860         0.42405426         0.334402701           8         0.231         5997.899         1548.4573         16446.886         37704.9755         11495.4270         0.3467288         0.23810538           10         0.333         44334.043         17266.644         2558.1150         10359.0865         0.23997373         0.167969648           12         0.333         44345.690         17355.157         22146.3673         8726.3455         0.23442065         0.115330533           13         0.36         3170.681         1885.2575         18450.453         6795.4671         47853.4529         0.2   |    |       |            |           |             |             |            |              |
| 4         0.099         98515.111         1.0699.125         89207.3493         9688.2657         0.62213238         0.563352970           5         0.132         85966.633         12571.514         74706.8863         10924.9207         0.54288754         0.4771781155           6         0.165         75680.689         13974.386         62820.9067         11599.8360         0.47793082         0.334672013           7         0.198         67149.298         1503.2956         52962.4100         11856.860         0.42405426         0.334667201           8         0.231         59997.899         15835.881         44698.5715         11797.7673         0.34067288         0.238110538           10         0.297         48779.318         16912.395         31734.8773         11002.8760         0.30804607         0.200408755           12         0.330         4433.4043         17266.644         26598.1150         10359.0865         0.297997373         0.167696948           13         0.330         3170.680         17737.156         1826.26731         8726.3455         0.23442065         0.115330533           14         0.429         31566.963         17996.641         11845.0453         6752.9786         0.1993480         0.074802597   |    | 0.033 | 133495.573 | 4742.603  |             | 4605.2460   | 0.84303735 | 0.818620940  |
| 5         0.132         85966.633         12571.514         74706.8863         10924.9207         0.54288754         0.471781155           6         0.105         75680.689         13974.386         62820.9067         11599.8360         0.4204526         0.393462701           8         0.231         59997.899         15835.881         44698.5715         11797.7673         0.37889249         0.282275768           9         0.264         53945.749         1646.886         37704.9755         11495.4270         0.30804607         0.229016753           11         0.330         44334.043         17266.644         26598.1150         10359.0865         0.27997373         0.16796968           12         0.333         1340.569         17535.157         22146.3673         5993.0082         0.25564499         0.139856435           15         0.462         3156.963         1799.6641         11845.0453         6752.9786         0.19934840         0.174802597           16         0.492         29256.749         1807.3975         1975.4612         5663.370         0.1401765         0.19934840         0.074802597           17         0.528         27197.136         18125.983         6795.4671         4528.9519         0.17175252 <th< td=""><td>3</td><td>0.066</td><td>114027.943</td><td>8177.331</td><td>107133.2883</td><td>7682.8922</td><td>0.72009740</td><td>0.676556994</td></th<>          | 3  | 0.066 | 114027.943 | 8177.331  | 107133.2883 | 7682.8922   | 0.72009740 | 0.676556994  |
| 66         0.165         7580.689         13974.386         62820.9067         11599.8360         0.44793082         0.334462701           7         0.198         67149.298         15032.956         52962.4100         11856.8860         0.42405426         0.334462701           9         0.264         53945.749         16446.886         37704.9755         11495.4270         0.34067258         0.238110538           10         0.297         48779.318         16912.395         31734.8773         11002.8760         0.30804607         0.200408795           11         0.330         4433.0431         17256.157         22146.3673         9593.0082         0.25564499         0.139856435           13         0.396         37120.6080         17737.156         18262.6731         8726.3455         0.23442065         0.17369648           14         0.429         31566.963         17996.641         11883.0437         7775.5050         0.21579157         0.093803596           15         0.462         31566.963         17996.641         11883.0435         6752.9786         0.1993480         0.074802597           16         0.495         29256.749         18073.975         1754.6421         5668.3370         0.18475918         0.07379394  | 4  | 0.099 | 98515.111  | 10699.125 | 89207.3493  | 9688.2657   | 0.62213238 | 0.563352970  |
| 7         0.198         67149.298         15032.956         52962.4100         11856.8860         0.42405426         0.334462701           8         0.231         5999.899         15835.881         44698.5715         11495.4270         0.3466728         0.238116538           10         0.297         48779.318         16912.395         31734.8773         11002.8760         0.30804607         0.200408795           11         0.330         4433.4043         17266.644         26598.1150         10359.0865         0.2759733         0.167969648           12         0.363         34170.680         17737.156         18262.6731         8726.3455         0.23442065         0.11530533           13         0.396         37120.680         17737.156         18262.6731         8726.3455         0.23442065         0.11530533           14         0.429         34170.751         17887.251         14835.38671         7775.5650         0.21579157         0.093803964           16         0.459         29256.749         18073.975         9175.4642         5668.3370         0.18475918         0.057943937           17         0.528         27197.136         18125.983         6795.4671         4528.9519         0.17175252         0.042914027 </td <td>5</td> <td>0.132</td> <td>85966.633</td> <td>12571.514</td> <td>74706.8863</td> <td>10924.9207</td> <td>0.54288754</td> <td>0.471781155</td>          | 5  | 0.132 | 85966.633  | 12571.514 | 74706.8863  | 10924.9207  | 0.54288754 | 0.471781155  |
| 8         0.231         59997.899         15835.881         44698.5715         11797.7673         0.37889249         0.282275768           9         0.264         53945.749         16446.886         37704.9755         11495.4270         0.34067280         0.238110538           10         0.297         48779.318         16912.395         31734.8773         11002.8760         0.30804607         0.200408795           11         0.330         4433.4043         17266.644         26598.1150         10359.0865         0.27997373         0.16796948           12         0.363         40481.569         17535.157         22146.3673         8726.3455         0.23442065         0.13836335           14         0.429         34170.751         17887.251         14853.8671         7775.5050         0.21579157         0.038803596           15         0.462         31566.963         17996.641         11845.0453         6752.9786         0.19934840         0.074802597           16         0.495         29256.749         18073.975         9175.4642         5668.3370         0.1847518         0.0579433937           17         0.528         23791.136         18125.933         6795.4671         4528.9519         0.17175252         0.042914027  | 6  | 0.165 | 75680.689  | 13974.386 | 62820.9067  | 11599.8360  | 0.47793082 | 0.396720053  |
| 9         0.264         53945.749         16446.886         37704.9755         11495.4270         0.34067258         0.238110538           10         0.297         48779.318         16912.395         31734.8773         11002.8760         0.30804607         0.200408795           12         0.363         40481.569         17535.157         22146.3673         9593.0082         0.25564499         0.139856435           13         0.396         37120.680         17737.156         18262.6731         8726.3455         0.23442065         0.115330533           15         0.462         31566.963         17996.641         11845.0453         6752.9786         0.19934840         0.074802597           16         0.495         29256.749         18073.975         9175.4642         5668.3370         0.18475918         0.057943937           17         0.528         27197.136         18125.983         6795.4671         4528.9519         0.17175252         0.042914027           18         0.561         25352.732         18157.932         4664.1556         3340.5245         0.1601043         0.0294454590           19         0.594         23694.182         18177.391         1017.5077         833.2501         0.14017605         0.004245699 </td <td>7</td> <td>0.198</td> <td>67149.298</td> <td>15032.956</td> <td>52962.4100</td> <td>11856.8860</td> <td>0.42405426</td> <td>0.334462701</td>          | 7  | 0.198 | 67149.298  | 15032.956 | 52962.4100  | 11856.8860  | 0.42405426 | 0.334462701  |
| 10         0.297         48779.318         16912.395         31734.8773         11002.8760         0.30804607         0.200408795           11         0.330         4433.403         17266.644         26598.1150         10359.0882         0.255664499         0.139856435           13         0.396         37120.680         17737.156         18262.6731         8726.3455         0.23442065         0.115330533           14         0.429         34170.751         17887.251         14853.8671         7775.5050         0.21579157         0.093803596           16         0.495         29256.749         18073.975         9175.4642         5668.3370         0.18475918         0.057943937           17         0.528         27197.136         18125.983         6795.4671         4528.9519         0.1417552         0.042914027           18         0.561         23694.182         18173.991         1017.5077         833.2501         0.14017605         0.06425659           21         0.660         20840.537         18170.802         -549.9357         -479.4872         0.13160999         -0.03472896           22         0.693         1944.490         1819.994         -4462.7016         -4630.2757         0.11022678         -0.028182389 <td>8</td> <td>0.231</td> <td>59997.899</td> <td>15835.881</td> <td>44698.5715</td> <td>11797.7673</td> <td>0.37889249</td> <td>0.282275768</td>                | 8  | 0.231 | 59997.899  | 15835.881 | 44698.5715  | 11797.7673  | 0.37889249 | 0.282275768  |
| 11         0.330         44334.043         17266.644         26598.1150         10359.0865         0.27997373         0.167969648           12         0.363         40481.569         17535.157         22146.3673         8953.082         0.25564499         0.13986463           13         0.369         37120.660         17737.156         18262.6731         8756.3455         0.23442065         0.115330533           14         0.429         34170.751         17887.251         14853.8671         7775.5050         0.21579157         0.038803596           15         0.462         31566.963         17996.641         11845.0453         6752.9786         0.19934840         0.074802597           16         0.455         29256.749         18073.975         9175.4642         5668.3370         0.18475918         0.057943937           17         0.528         27191.316         18125.983         6795.4671         4528.9519         0.17175252         0.042914027           18         0.561         2352.732         1817.391         1017.5077         833.2501         0.1610493         0.029454590           21         0.660         2084.182         18173.93         2477.6088         2107.4781         0.146660         0.0847.519         1817   | 9  | 0.264 | 53945.749  | 16446.886 | 37704.9755  | 11495.4270  | 0.34067258 | 0.238110538  |
| 12         0.363         40481.569         17535.157         22146.3673         9593.0082         0.25564499         0.139856435           13         0.396         37120.680         17737.156         18262.6731         8726.3455         0.23442065         0.115330533           15         0.462         31566.963         17996.641         11845.0453         6752.9786         0.19934840         0.074802597           16         0.495         29256.749         18073.975         9175.4642         5668.3370         0.18475918         0.057943937           17         0.528         27197.136         18125.983         6795.4671         4528.9519         0.17175525         0.042914029           18         0.561         23532.732         18173.973         2747.6088         2107.4781         0.14017605         0.042945450           19         0.594         23694.182         18175.391         1017.5077         833.2501         0.14017605         0.006425659           21         0.660         20840.537         18170.802         -549.9357         -479.4872         0.13160999         -0.03472896           22         0.693         1964.4490         18199.904         -4462.7016         -4630.2757         0.11022678         -0.028182389 </td <td>10</td> <td>0.297</td> <td>48779.318</td> <td>16912.395</td> <td>31734.8773</td> <td>11002.8760</td> <td>0.30804607</td> <td>0.200408795</td>         | 10 | 0.297 | 48779.318  | 16912.395 | 31734.8773  | 11002.8760  | 0.30804607 | 0.200408795  |
| 13         0.396         37120.680         17737.156         18262.6731         8726.3455         0.23442065         0.115330533           14         0.429         34170.751         17887.251         14853.8671         7775.5050         0.21579157         0.093803596           15         0.462         31566.963         17996.641         11845.0453         6752.9786         0.19934840         0.074802597           16         0.495         29256.749         18073.975         9175.4642         5668.3370         0.18475918         0.057943937           17         0.528         27197.136         18125.983         6795.4671         4528.9519         0.17175252         0.042914027           18         0.561         23594.23         1817.391         1017.5077         833.2501         0.14017603         0.029454590           19         0.594         23984         18170.802         -499.9357         -479.4872         0.14107605         0.006425659           20         0.693         19607.465         18156.294         -1974.8191         -1828.6604         0.12382302         -0.0124711712           21         0.693         19607.465         18156.294         -1974.2152         -3212.6666         0.11672184         -0.020676933 <td>11</td> <td>0.330</td> <td>44334.043</td> <td>17266.644</td> <td>26598.1150</td> <td>10359.0865</td> <td>0.27997373</td> <td>0.167969648</td>                | 11 | 0.330 | 44334.043  | 17266.644 | 26598.1150  | 10359.0865  | 0.27997373 | 0.167969648  |
| 14         0.429         34170.751         17887.251         14853.8671         7775.5050         0.21579157         0.093803596           15         0.462         31566.963         17996.641         11845.0453         6752.9786         0.19934840         0.074802597           17         0.528         27197.136         18125.983         6795.4671         4528.9519         0.17175252         0.042914027           18         0.561         25352.732         18157.932         4664.1556         3340.5245         0.16010493         0.029454590           19         0.594         23694.182         18173.973         2747.6088         2107.4781         0.14963103         0.017351413           20         0.627         22196.979         18177.391         107.5077         833.2501         0.14017605         0.006425659           21         0.660         20840.537         18170.802         -549.9357         -479.4872         0.13160999         -0.003472896           22         0.693         19607.465         18156.294         -1974.8191         -1828.6604         0.12382302         -0.012471172           23         0.725         17454.490         18109.904         -4462.7016         -4630.2757         0.11022678         -0.028182389  | 12 | 0.363 | 40481.569  | 17535.157 | 22146.3673  | 9593.0082   | 0.25564499 | 0.139856435  |
| 15         0.462         31566.963         17996.641         11845.0453         6752.9786         0.19934840         0.074802597           16         0.495         29256.749         18073.975         9175.4642         5668.3370         0.18475918         0.057943937           17         0.528         27197.136         18125.983         6795.4671         4528.9519         0.17175252         0.042914027           18         0.561         25352.732         18157.932         4664.1556         3340.5245         0.16016043         0.029454590           19         0.594         23694.182         18173.973         2747.6088         2107.4781         0.14017605         0.006425659           21         0.660         20840.537         18170.802         549.9357         -479.4872         0.13160999         -0.012471172           22         0.693         19607.465         18156.294         -1974.8191         -1828.6604         0.12382302         -0.012471172           23         0.726         18482.988         18135.545         -3274.2152         -3212.6666         0.11672184         -0.026676983           24         0.759         17454.490         18109.904         -4462.7016         -4630.2757         0.11022678         -0.028063636   | 13 | 0.396 | 37120.680  | 17737.156 | 18262.6731  | 8726.3455   | 0.23442065 | 0.115330533  |
| 16         0.495         29256.749         18073.975         9175.4642         5668.3370         0.18475918         0.057943937           17         0.528         27197.136         18125.983         6795.4671         4528.9519         0.17175252         0.042914027           18         0.561         25352.732         18157.932         4664.1556         3340.5245         0.16010493         0.029454590           19         0.594         23694.182         18173.973         2747.6088         2107.4781         0.14017605         0.006425659           21         0.660         20840.537         18170.802         -549.9357         -479.4872         0.13160999         -0.03472896           22         0.693         19607.465         18156.294         -1974.8191         -1828.6604         0.12382302         -0.02471172           23         0.726         18482.988         18135.545         -3274.2152         -3212.6666         0.11022678         -0.028182389           24         0.759         17454.490         18109.904         -4462.7016         -4630.2757         0.11022678         -0.028182389           25         0.792         16511.148         18080.462         -5552.7859         -6080.5544         0.10426948         -0.035066376  | 14 | 0.429 | 34170.751  | 17887.251 | 14853.8671  | 7775.5050   | 0.21579157 | 0.093803596  |
| 17         0.528         27197.136         18125.983         6795.4671         4528.9519         0.17175252         0.042914027           18         0.561         25352.732         18157.932         4664.1556         3340.5245         0.16010493         0.029454590           19         0.594         23694.182         18173.973         2747.6088         2107.4781         0.14963103         0.017551413           20         0.627         22196.979         18170.802         -549.9357         -479.4872         0.13160999         -0.003472896           21         0.660         20840.537         18170.802         -549.9357         -479.4872         0.13160999         -0.003472896           22         0.693         19607.465         18156.294         -1974.8191         -1828.6604         0.12382302         -0.012471172           23         0.759         17454.490         18109.904         -4462.7016         -4630.2757         0.11022678         -0.028182389           25         0.792         16511.48         18080.462         -5552.7859         -6080.5544         0.10426948         -0.03566376           26         0.825         15643.632         18048.098         -6555.2488         -7562.8074         0.09879104         -0.041397025   | 15 | 0.462 | 31566.963  | 17996.641 | 11845.0453  | 6752.9786   | 0.19934840 | 0.074802597  |
| 18         0.561         25352.732         18157.932         4664.1556         3340.5245         0.16010493         0.029454590           19         0.594         23694.182         18173.973         2747.6088         2107.4781         0.14963103         0.017351413           20         0.627         22196.979         18177.391         1017.5077         833.2501         0.14017605         0.006425659           21         0.660         20840.537         18170.802         -549.9357         -479.4872         0.13160999         -0.003472896           22         0.693         19607.465         18156.294         -1974.8191         -1828.6604         0.12382302         -0.012471172           23         0.726         18482.988         18195.545         -3274.2152         -3212.6666         0.11672184         -0.026676983           24         0.759         17454.490         18109.904         -4462.7016         -4630.2757         0.11022678         -0.0228182389           25         0.792         16511.148         18080.462         -5552.7859         -6080.5544         0.10426948         -0.03566376           26         0.825         15643.632         18048.098         -6555.2488         -7562.8074         0.09879104         -0.041393679 </td <td>16</td> <td>0.495</td> <td>29256.749</td> <td>18073.975</td> <td>9175.4642</td> <td>5668.3370</td> <td>0.18475918</td> <td>0.057943937</td> | 16 | 0.495 | 29256.749  | 18073.975 | 9175.4642   | 5668.3370   | 0.18475918 | 0.057943937  |
| 19         0.594         23694.182         18173.973         2747.6088         2107.4781         0.14963103         0.017351413           20         0.627         22196.979         18177.391         1017.5077         833.2501         0.14017605         0.006425659           21         0.660         20840.537         18170.802         -549.9357         -479.4872         0.13160999         -0.002472896           22         0.693         19607.465         18156.294         -1974.8191         -1828.6604         0.12382302         -0.012471172           23         0.726         18482.988         18135.545         -3274.2152         -3212.6666         0.11622678         -0.028182389           24         0.759         17454.490         18109.904         -4462.7016         -4630.2757         0.11022678         -0.028182389           25         0.792         16511.148         1808.0862         -5552.7859         -6080.5544         0.10426948         -0.03506376           26         0.825         15643.632         18048.098         -6555.2488         -7562.8074         0.09879104         -0.047233274           27         0.858         14843.866         18013.529         -7479.4230         -9076.5306         0.09374044         -0.04723354<  | 17 | 0.528 | 27197.136  | 18125.983 | 6795.4671   | 4528.9519   | 0.17175252 | 0.042914027  |
| 20         0.627         22196.979         18177.391         1017.5077         833.2501         0.14017605         0.006425659           21         0.660         20840.537         18170.802         -549.9357         -479.4872         0.13160999         -0.03472896           22         0.693         19607.465         18156.294         -1974.8191         -1828.6604         0.12382302         -0.012471172           23         0.726         18482.988         18135.545         -3274.2152         -3212.6666         0.11672184         -0.02676983           25         0.759         16511.148         1808.0462         -5552.7859         -6080.5544         0.10426948         -0.035066376           26         0.825         15643.632         18048.098         -6555.2488         -7562.8074         0.09879104         -0.041397025           27         0.858         14843.866         18013.529         -7479.4230         -9076.5306         0.09374044         -0.047233274           28         0.891         14104.829         17977.334         -8333.4207         -10621.3752         0.08907335         -0.052626351           31         0.990         12785.201         17901.861         -9858.3239         -1380.6423         0.08775777         -0.062256  | 18 | 0.561 | 25352.732  | 18157.932 | 4664.1556   | 3340.5245   | 0.16010493 | 0.029454590  |
| 21         0.660         20840.537         18170.802         -549.9357         -479.4872         0.13160999         -0.003472896           22         0.693         19607.465         18156.294         -1974.8191         -1828.6604         0.12382302         -0.012471172           23         0.726         18482.988         18135.545         -3274.2152         -3212.6666         0.11672184         -0.020676983           24         0.759         17454.490         18109.904         -4462.7016         -4630.2757         0.11022678         -0.0231663636           25         0.792         16511.148         18080.462         -5552.7859         -6080.5544         0.10426948         -0.035066376           26         0.825         15643.632         18048.098         -6555.2488         -7562.8074         0.09879104         -0.041397025           27         0.858         14843.866         18013.529         -7479.4230         -9076.5306         0.09374044         -0.047233274           28         0.891         14104.829         17977.334         -8333.4207         -10621.3752         0.08907335         -0.052626351           30         0.957         12785.201         17901.861         -9858.3239         -1380.6423         0.0807397         -0.  | 19 | 0.594 | 23694.182  | 18173.973 | 2747.6088   | 2107.4781   | 0.14963103 | 0.017351413  |
| 22         0.693         19607.465         18156.294         -1974.8191         -1828.6604         0.12382302         -0.012471172           23         0.726         18482.988         18135.545         -3274.2152         -3212.6666         0.11672184         -0.020676983           24         0.759         17454.490         18109.904         -4462.7016         -4630.2757         0.11022678         -0.028182389           25         0.792         16511.148         18080.462         -5552.7859         -6080.5544         0.10426948         -0.035066376           26         0.825         15643.632         18048.098         -6555.2488         -7562.8074         0.09879104         -0.041397025           27         0.858         14843.866         18013.529         -7479.4230         -9076.5306         0.09374044         -0.047233274           28         0.891         14104.829         17977.334         -8333.4207         -10621.3752         0.08907335         -0.0576206331           29         0.924         13420.396         17939.984         -9124.3209         -12197.1187         0.08475109         -0.0576206331           31         0.990         12194.529         17863.278         -10540.8791         -15440.9124         0.07709962   | 20 | 0.627 | 22196.979  | 18177.391 | 1017.5077   | 833.2501    | 0.14017605 | 0.006425659  |
| 23         0.726         18482.988         18135.545         -3274.2152         -3212.6666         0.11672184         -0.020676983           24         0.759         17454.490         18109.904         -4462.7016         -4630.2757         0.11022678         -0.028182389           25         0.792         16511.148         18080.462         -5552.7859         -6080.5544         0.10426948         -0.035066376           26         0.825         15643.632         18048.098         -6555.2488         -7562.8074         0.09879104         -0.041397025           27         0.858         14843.866         18013.529         -7479.4230         -9076.5306         0.09374044         -0.047233274           28         0.891         14104.829         17977.334         -8333.4207         -10621.3752         0.08907335         -0.057620962           30         0.957         12785.201         17901.861         -9858.3239         -13803.6423         0.08073977         -0.062562631           31         0.990         12194.529         17863.278         -10540.8791         -15440.9124         0.07709962         -0.06556663           32         1.023         11644.219         17824.484         -111770.3153         -18807.9002         0.07029977   | 21 | 0.660 | 20840.537  | 18170.802 | -549.9357   | -479.4872   | 0.13160999 | -0.003472896 |
| 24         0.759         17454.490         18109.904         -4462.7016         -4630.2757         0.11022678         -0.028182389           25         0.792         16511.148         18080.462         -5552.7859         -6080.5544         0.10426948         -0.035066376           26         0.825         15643.632         18048.098         -6555.2488         -7562.8074         0.09879104         -0.041397025           27         0.858         14843.866         18013.529         -7479.4230         -9076.5306         0.09374044         -0.047233274           28         0.891         14104.829         17977.334         -8333.4207         -10621.3752         0.08973335         -0.052626351           29         0.924         13420.396         17991.861         -9858.3239         -13803.6423         0.08073977         -0.06256261           31         0.990         12194.529         17863.278         -10540.8791         -15440.9124         0.0770962         -0.06256261           32         1.023         11644.219         17824.484         -11176.7924         -17108.9662         0.07353436         -0.070582516           33         1.056         11130.594         17785.683         -11770.3153         -18807.9002         0.07029077         <  | 22 | 0.693 | 19607.465  | 18156.294 | -1974.8191  | -1828.6604  | 0.12382302 | -0.012471172 |
| 25         0.792         16511.148         18080.462         -5552.7859         -6080.5544         0.10426948         -0.035066376           26         0.825         15643.632         18048.098         -6555.2488         -7562.8074         0.09879104         -0.041397025           27         0.858         14843.866         18013.529         -7479.4230         -9076.5306         0.09374044         -0.047233274           28         0.891         14104.829         17977.334         -8333.4207         -10621.3752         0.08907335         -0.052626351           29         0.924         13420.396         17939.984         -9124.3209         -12197.1187         0.08475109         -0.057620962           30         0.957         12785.201         17901.861         -9858.3239         -13803.6423         0.08073977         -0.062562631           31         0.090         12194.529         17863.278         -10540.8791         -15440.9124         0.07709062         -0.066566663           32         1.023         11644.219         17856.683         -11770.3153         -18807.9002         0.07709962         -0.07836670           34         1.089         10650.387         17747.039         -12325.204         -20537.8601         0.06725822  | 23 | 0.726 | 18482.988  | 18135.545 | -3274.2152  | -3212.6666  | 0.11672184 | -0.020676983 |
| 26         0.825         15643.632         18048.098         -6555.2488         -7562.8074         0.09879104         -0.041397025           27         0.858         14843.866         18013.529         -7479.4230         -9076.5306         0.09374044         -0.047233274           28         0.891         14104.829         17977.334         -8333.4207         -10621.3752         0.08907335         -0.052626351           29         0.924         13420.396         17939.984         -9124.3209         -12197.1187         0.08475109         -0.057620962           30         0.957         12785.201         17901.861         -9858.3239         -13803.6423         0.08073977         -0.062256261           31         0.990         12194.529         17863.278         -10540.8791         -15440.9124         0.07700962         -0.066566663           32         1.023         11644.219         17824.484         -11176.7924         -17108.9662         0.0735346         -0.070582516           33         1.056         11130.594         17785.683         -11770.3153         -18807.9002         0.07029077         -0.074330670           34         1.089         10650.387         17747.039         -12325.204         -20537.8601         0.06441837  | 24 | 0.759 | 17454.490  | 18109.904 | -4462.7016  | -4630.2757  | 0.11022678 | -0.028182389 |
| 27         0.858         14843.866         18013.529         -7479.4230         -9076.5306         0.09374044         -0.047233274           28         0.891         14104.829         17977.334         -8333.4207         -10621.3752         0.08907335         -0.052626351           29         0.924         13420.396         17939.984         -9124.3209         -12197.1187         0.08475109         -0.057620962           30         0.957         12785.201         17901.861         -9858.3239         -13803.6423         0.08073977         -0.062256261           31         0.990         12194.529         17863.278         -10540.8791         -15440.9124         0.07700962         -0.066566663           32         1.023         11644.219         17824.484         -11176.7924         -17108.9662         0.07353436         -0.070582516           33         1.056         11130.594         17785.683         -11770.3153         -18807.9002         0.07029077         -0.074330670           34         1.089         10650.387         17747.039         -12344.8651         -22299.0340         0.06441837         -0.081116555           36         1.155         9778.923         17670.718         -13332.2453         -24091.6455         0.06175484   | 25 | 0.792 | 16511.148  | 18080.462 | -5552.7859  | -6080.5544  | 0.10426948 | -0.035066376 |
| 28         0.891         14104.829         17977.334         -8333.4207         -10621.3752         0.08907335         -0.052626351           29         0.924         13420.396         17939.984         -9124.3209         -12197.1187         0.08475109         -0.057620962           30         0.957         12785.201         17901.861         -9858.3239         -13803.6423         0.08073977         -0.062256261           31         0.990         12194.529         17863.278         -10540.8791         -15440.9124         0.07700962         -0.066566663           32         1.023         11644.219         17824.484         -11176.7924         -17108.9662         0.07353436         -0.070582516           33         1.056         11130.594         17785.683         -11770.3153         -18807.9002         0.07029077         -0.074330670           34         1.089         10650.387         17747.039         -12325.2204         -20537.8601         0.06725822         -0.077834949           35         1.122         10200.695         17708.682         -12844.8651         -22299.0340         0.06441837         -0.081116555           36         1.155         9978.923         17670.718         -13332.2453         -24091.6455         0.06175484   | 26 | 0.825 | 15643.632  | 18048.098 | -6555.2488  | -7562.8074  | 0.09879104 | -0.041397025 |
| 29         0.924         13420.396         17939.984         -9124.3209         -12197.1187         0.08475109         -0.057620962           30         0.957         12785.201         17901.861         -9858.3239         -13803.6423         0.08073977         -0.062256261           31         0.990         12194.529         17863.278         -10540.8791         -15440.9124         0.07700962         -0.066566663           32         1.023         11644.219         17824.484         -11176.7924         -17108.9662         0.07353436         -0.070582516           33         1.056         11130.594         17785.683         -11770.3153         -18807.9002         0.07029077         -0.074330670           34         1.089         10650.387         17747.039         -12325.2204         -20537.8601         0.06725822         -0.077834949           35         1.122         10200.695         17708.682         -12844.8651         -22299.0340         0.06441837         -0.081116555           36         1.155         9778.923         17670.718         -13332.2453         -24091.6455         0.06175484         -0.084194408           37         1.188         9382.753         17633.229         -13790.0417         -25915.9490         0.05925299   | 27 | 0.858 | 14843.866  | 18013.529 | -7479.4230  | -9076.5306  | 0.09374044 | -0.047233274 |
| 30         0.957         12785.201         17901.861         -9858.3239         -13803.6423         0.08073977         -0.062256261           31         0.990         12194.529         17863.278         -10540.8791         -15440.9124         0.07700962         -0.066566663           32         1.023         11644.219         17824.484         -11176.7924         -17108.9662         0.07353436         -0.070582516           33         1.056         11130.594         17785.683         -11770.3153         -18807.9002         0.07029077         -0.074330670           34         1.089         10650.387         17747.039         -12325.2204         -20537.8601         0.06725822         -0.077834949           35         1.122         10200.695         17708.682         -12844.8651         -22299.0340         0.06441837         -0.081116555           36         1.155         9778.923         17670.718         -13332.2453         -24091.6455         0.06175484         -0.084194408           37         1.188         9382.753         17633.229         -13790.0417         -25915.9490         0.05925299         -0.087085436           38         1.221         9010.104         17596.277         -14220.6586         -27772.2255         0.05689967   | 28 | 0.891 | 14104.829  | 17977.334 | -8333.4207  | -10621.3752 | 0.08907335 | -0.052626351 |
| 31         0.990         12194.529         17863.278         -10540.8791         -15440.9124         0.07700962         -0.066566663           32         1.023         11644.219         17824.484         -11176.7924         -17108.9662         0.07353436         -0.070582516           33         1.056         11130.594         17785.683         -11770.3153         -18807.9002         0.07029077         -0.074330670           34         1.089         10650.387         17747.039         -12325.2204         -20537.8601         0.06725822         -0.077834949           35         1.122         10200.695         17708.682         -12844.8651         -22299.0340         0.06441837         -0.081116555           36         1.155         9778.923         17670.718         -13332.2453         -24091.6455         0.06175484         -0.084194408           37         1.188         9382.753         17633.229         -13790.0417         -25915.9490         0.05925299         -0.087085436           38         1.221         9010.104         17596.277         -14220.6586         -27772.2255         0.05689967         -0.09804824           49         1.287         8328.069         17524.169         -15008.7880         -31581.9351         0.05259256  | 29 | 0.924 | 13420.396  | 17939.984 | -9124.3209  | -12197.1187 | 0.08475109 | -0.057620962 |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$  | 30 | 0.957 | 12785.201  | 17901.861 | -9858.3239  | -13803.6423 | 0.08073977 | -0.062256261 |
| 33         1.056         11130.594         17785.683         -11770.3153         -18807.9002         0.07029077         -0.074330670           34         1.089         10650.387         17747.039         -12325.2204         -20537.8601         0.06725822         -0.077834949           35         1.122         10200.695         17708.682         -12844.8651         -22299.0340         0.06441837         -0.081116555           36         1.155         9778.923         17670.718         -13332.2453         -24091.6455         0.06175484         -0.084194408           37         1.188         9382.753         17633.229         -13790.0417         -25915.9490         0.05925299         -0.087085436           38         1.221         9010.104         17596.277         -14220.6586         -27772.2255         0.05689967         -0.089804824           39         1.254         8659.105         17559.911         -14626.2580         -29660.7794         0.05468308         -0.092366222           40         1.287         8328.069         17524.169         -15008.7880         -31581.9351         0.05259256         -0.094781936           41         1.320         8015.474         17489.075         -15370.0085         -33536.0356         0.05061849   | 31 | 0.990 | 12194.529  | 17863.278 | -10540.8791 | -15440.9124 | 0.07700962 | -0.066566663 |
| 34         1.089         10650.387         17747.039         -12325.2204         -20537.8601         0.06725822         -0.077834949           35         1.122         10200.695         17708.682         -12844.8651         -22299.0340         0.06441837         -0.081116555           36         1.155         9778.923         17670.718         -13332.2453         -24091.6455         0.06175484         -0.084194408           37         1.188         9382.753         17633.229         -13790.0417         -25915.9490         0.05925299         -0.087085436           38         1.221         9010.104         17596.277         -14220.6586         -27772.2255         0.05689967         -0.089804824           39         1.254         8659.105         17559.911         -14626.2580         -29660.7794         0.05468308         -0.092366222           40         1.287         8328.069         17524.169         -15008.7880         -31581.9351         0.05259256         -0.094781936           41         1.320         8015.474         17489.075         -15370.0085         -33536.0356         0.05061849         -0.099219707           43         1.386         7440.223         17420.897         -16034.7436         -37544.5220         0.04698572  | 32 | 1.023 | 11644.219  | 17824.484 | -11176.7924 | -17108.9662 | 0.07353436 | -0.070582516 |
| 35         1.122         10200.695         17708.682         -12844.8651         -22299.0340         0.06441837         -0.081116555           36         1.155         9778.923         17670.718         -13332.2453         -24091.6455         0.06175484         -0.084194408           37         1.188         9382.753         17633.229         -13790.0417         -25915.9490         0.05925299         -0.087085436           38         1.221         9010.104         17596.277         -14220.6586         -27772.2255         0.05689967         -0.089804824           39         1.254         8659.105         17559.911         -14626.2580         -29660.7794         0.05468308         -0.092366222           40         1.287         8328.069         17524.169         -15008.7880         -31581.9351         0.05259256         -0.094781936           41         1.320         8015.474         17489.075         -15370.0085         -33536.0356         0.05061849         -0.097063078           42         1.353         7719.942         17454.648         -15711.5122         -35523.4400         0.04875218         -0.099219707           43         1.386         7440.223         17420.897         -16034.7436         -37544.5220         0.04698572   | 33 | 1.056 | 11130.594  | 17785.683 | -11770.3153 | -18807.9002 | 0.07029077 | -0.074330670 |
| 36         1.155         9778.923         17670.718         -13332.2453         -24091.6455         0.06175484         -0.084194408           37         1.188         9382.753         17633.229         -13790.0417         -25915.9490         0.05925299         -0.087085436           38         1.221         9010.104         17596.277         -14220.6586         -27772.2255         0.05689967         -0.089804824           39         1.254         8659.105         17559.911         -14626.2580         -29660.7794         0.05468308         -0.092366222           40         1.287         8328.069         17524.169         -15008.7880         -31581.9351         0.05259256         -0.094781936           41         1.320         8015.474         17489.075         -15370.0085         -33536.0356         0.05061849         -0.097063078           42         1.353         7719.942         17454.648         -15711.5122         -35523.4400         0.04875218         -0.099219707           43         1.386         7440.223         17420.897         -16034.7436         -37544.5220         0.04698572         -0.101260944           44         1.419         7175.180         17387.827         -16341.0154         -39599.6686         0.04531195  | 34 | 1.089 | 10650.387  | 17747.039 | -12325.2204 | -20537.8601 | 0.06725822 | -0.077834949 |
| 37         1.188         9382.753         17633.229         -13790.0417         -25915.9490         0.05925299         -0.087085436           38         1.221         9010.104         17596.277         -14220.6586         -27772.2255         0.05689967         -0.089804824           39         1.254         8659.105         17559.911         -14626.2580         -29660.7794         0.05468308         -0.092366222           40         1.287         8328.069         17524.169         -15008.7880         -31581.9351         0.05259256         -0.094781936           41         1.320         8015.474         17489.075         -15370.0085         -33536.0356         0.05061849         -0.097063078           42         1.353         7719.942         17454.648         -15711.5122         -35523.4400         0.04875218         -0.099219707           43         1.386         7440.223         17420.897         -16034.7436         -37544.5220         0.04698572         -0.101260944           44         1.419         7175.180         17387.827         -16341.0154         -39599.6686         0.04531195         -0.103195080           45         1.452         6923.779         17355.439         -16631.5228         -41689.2794         0.04372433  | 35 | 1.122 | 10200.695  | 17708.682 | -12844.8651 | -22299.0340 | 0.06441837 | -0.081116555 |
| 38         1.221         9010.104         17596.277         -14220.6586         -27772.2255         0.05689967         -0.089804824           39         1.254         8659.105         17559.911         -14626.2580         -29660.7794         0.05468308         -0.092366222           40         1.287         8328.069         17524.169         -15008.7880         -31581.9351         0.05259256         -0.094781936           41         1.320         8015.474         17489.075         -15370.0085         -33536.0356         0.05061849         -0.097063078           42         1.353         7719.942         17454.648         -15711.5122         -35523.4400         0.04875218         -0.099219707           43         1.386         7440.223         17420.897         -16034.7436         -37544.5220         0.04698572         -0.101260944           44         1.419         7175.180         17387.827         -16341.0154         -39599.6686         0.04531195         -0.103195080           45         1.485         6685.078         17323.728         -16907.3557         -43813.7650         0.04221691         -0.106771574           47         1.518         6458.213         17292.687         -17169.5102         -45973.5466         0.04078424  | 36 | 1.155 | 9778.923   | 17670.718 | -13332.2453 | -24091.6455 | 0.06175484 | -0.084194408 |
| 39       1.254       8659.105       17559.911       -14626.2580       -29660.7794       0.05468308       -0.092366222         40       1.287       8328.069       17524.169       -15008.7880       -31581.9351       0.05259256       -0.094781936         41       1.320       8015.474       17489.075       -15370.0085       -33536.0356       0.05061849       -0.097063078         42       1.353       7719.942       17454.648       -15711.5122       -35523.4400       0.04875218       -0.099219707         43       1.386       7440.223       17420.897       -16034.7436       -37544.5220       0.04698572       -0.101260944         44       1.419       7175.180       17387.827       -16341.0154       -39599.6686       0.04531195       -0.103195080         45       1.452       6923.779       17355.439       -16631.5228       -41689.2794       0.04372433       -0.105029662         46       1.485       6685.078       17323.728       -16907.3557       -43813.7650       0.04221691       -0.106771574         47       1.518       6458.213       17292.687       -17169.5102       -45973.5466       0.04078424       -0.110002011         49       1.584       6036.906       17232.578   | 37 | 1.188 | 9382.753   | 17633.229 | -13790.0417 | -25915.9490 | 0.05925299 | -0.087085436 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | 38 | 1.221 | 9010.104   | 17596.277 | -14220.6586 | -27772.2255 | 0.05689967 | -0.089804824 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | 39 | 1.254 | 8659.105   | 17559.911 | -14626.2580 | -29660.7794 | 0.05468308 | -0.092366222 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | 40 | 1.287 | 8328.069   | 17524.169 | -15008.7880 | -31581.9351 | 0.05259256 | -0.094781936 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | 41 | 1.320 | 8015.474   | 17489.075 | -15370.0085 | -33536.0356 | 0.05061849 | -0.097063078 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | 42 | 1.353 | 7719.942   | 17454.648 | -15711.5122 | -35523.4400 | 0.04875218 | -0.099219707 |
| 45       1.452       6923.779       17355.439       -16631.5228       -41689.2794       0.04372433       -0.105029662         46       1.485       6685.078       17323.728       -16907.3557       -43813.7650       0.04221691       -0.106771574         47       1.518       6458.213       17292.687       -17169.5102       -45973.5466       0.04078424       -0.108427104         48       1.551       6242.397       17262.308       -17418.8978       -48169.0553       0.03942134       -0.110002011         49       1.584       6036.906       17232.578       -17656.3539       -50400.7315       0.03812364       -0.111501569         50       1.617       5841.077       17203.485       -17882.6456       -52669.0242       0.03688696       -0.112930623   | 43 | 1.386 | 7440.223   | 17420.897 | -16034.7436 | -37544.5220 | 0.04698572 | -0.101260944 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | 44 | 1.419 | 7175.180   | 17387.827 | -16341.0154 | -39599.6686 | 0.04531195 | -0.103195080 |
| 47     1.518     6458.213     17292.687     -17169.5102     -45973.5466     0.04078424     -0.108427104       48     1.551     6242.397     17262.308     -17418.8978     -48169.0553     0.03942134     -0.110002011       49     1.584     6036.906     17232.578     -17656.3539     -50400.7315     0.03812364     -0.111501569       50     1.617     5841.077     17203.485     -17882.6456     -52669.0242     0.03688696     -0.112930623   | 45 | 1.452 | 6923.779   | 17355.439 | -16631.5228 | -41689.2794 | 0.04372433 | -0.105029662 |
| 48     1.551     6242.397     17262.308     -17418.8978     -48169.0553     0.03942134     -0.110002011       49     1.584     6036.906     17232.578     -17656.3539     -50400.7315     0.03812364     -0.111501569       50     1.617     5841.077     17203.485     -17882.6456     -52669.0242     0.03688696     -0.112930623   | 46 | 1.485 | 6685.078   | 17323.728 | -16907.3557 | -43813.7650 | 0.04221691 | -0.106771574 |
| 49     1.584     6036.906     17232.578     -17656.3539     -50400.7315     0.03812364     -0.111501569       50     1.617     5841.077     17203.485     -17882.6456     -52669.0242     0.03688696     -0.112930623   | 47 | 1.518 | 6458.213   | 17292.687 | -17169.5102 | -45973.5466 | 0.04078424 | -0.108427104 |
| 50   1.617   5841.077   17203.485   -17882.6456   -52669.0242   0.03688696   -0.112930623   | 48 | 1.551 | 6242.397   | 17262.308 | -17418.8978 | -48169.0553 | 0.03942134 | -0.110002011 |
|   | 49 | 1.584 | 6036.906   | 17232.578 | -17656.3539 | -50400.7315 | 0.03812364 | -0.111501569 |
|   | 50 | 1.617 | 5841.077   | 17203.485 | -17882.6456 | -52669.0242 | 0.03688696 | -0.112930623 |
|   | 51 | 1.650 | 5654.299   | 17175.014 |             | -54974.3907 | 0.03570744 | -0.114293628 |