Distortionary Taxation, Debt, and Immigration

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City University London

Seminar: State University—Higher School of Economics
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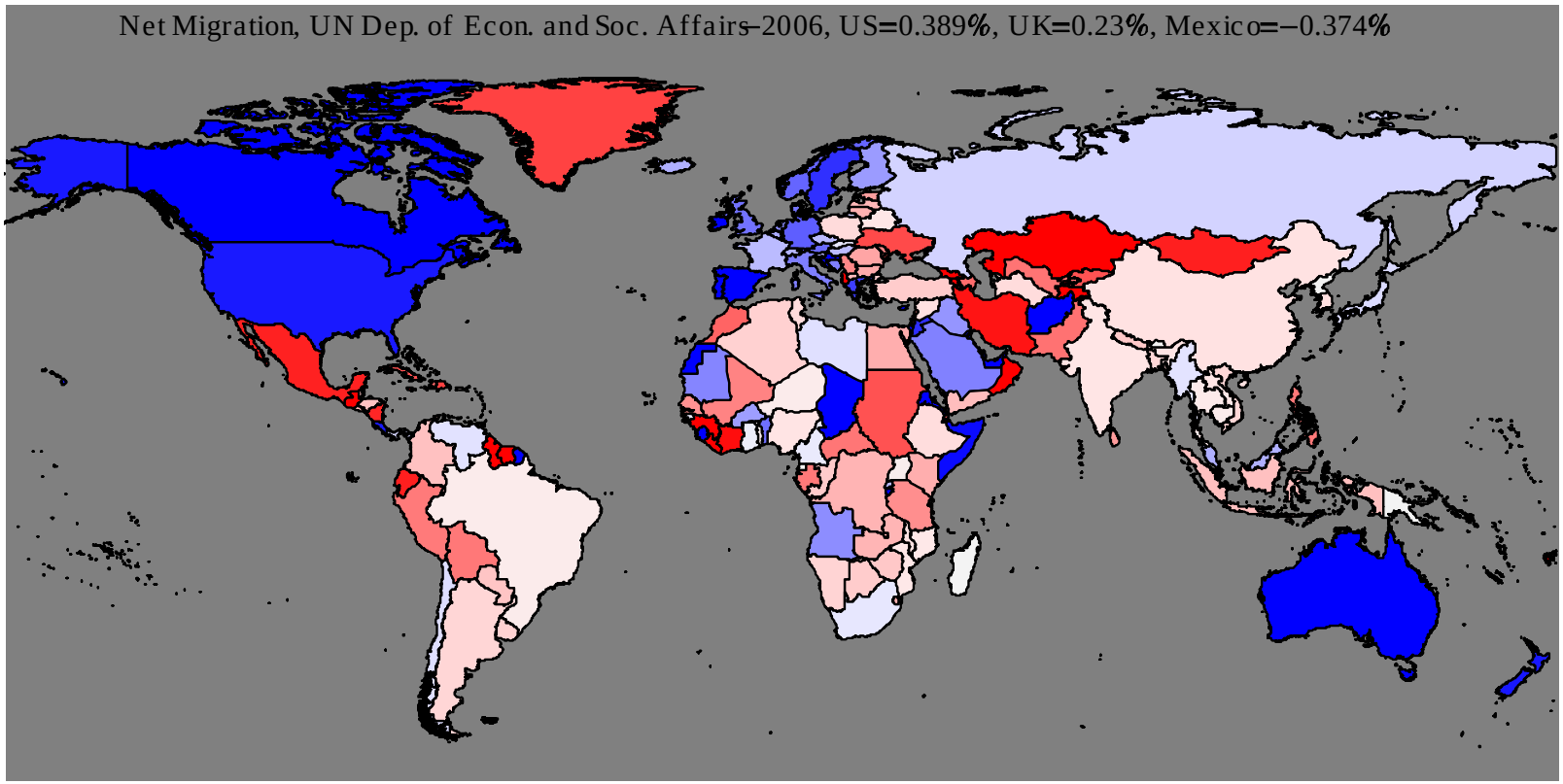
Introduction



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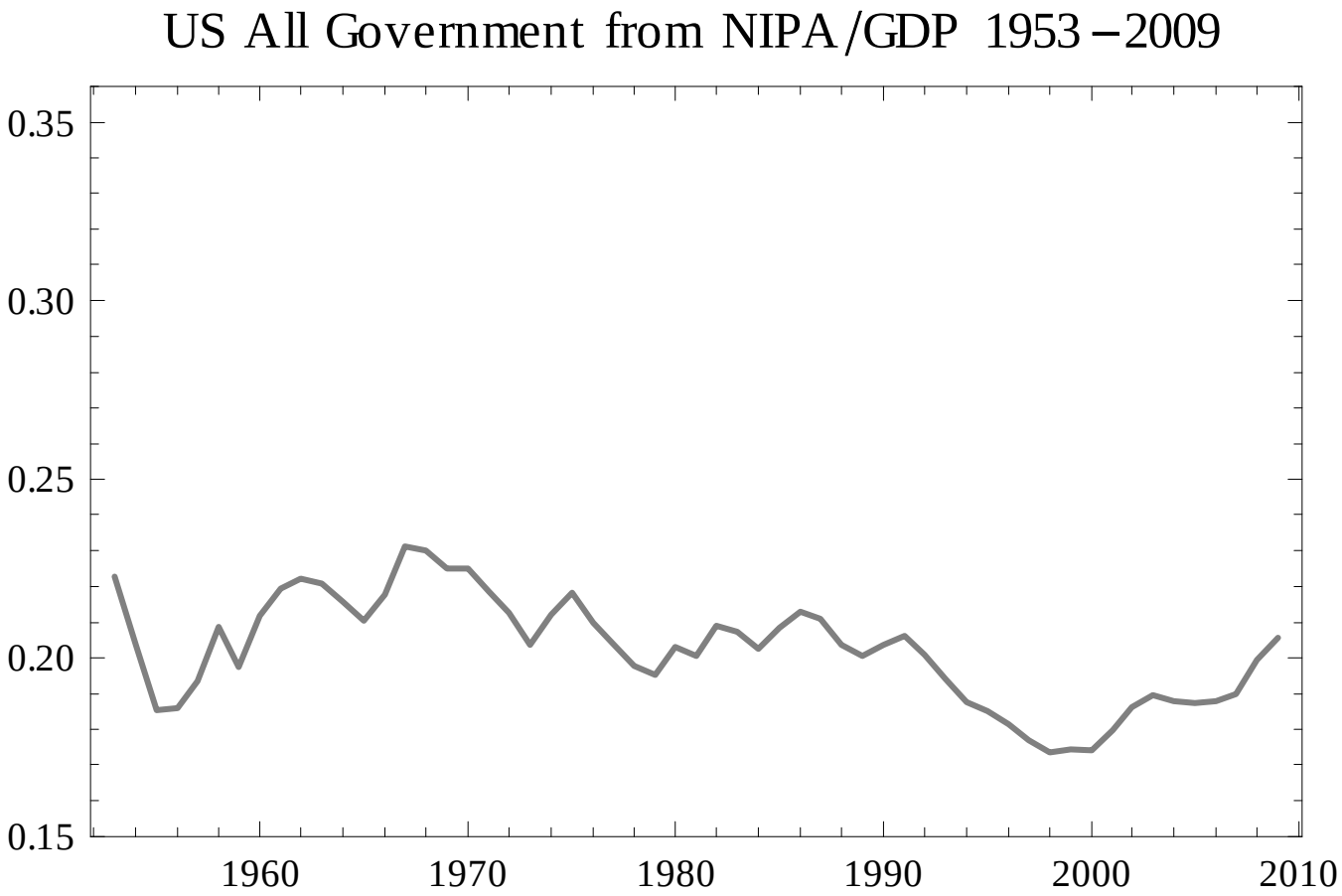

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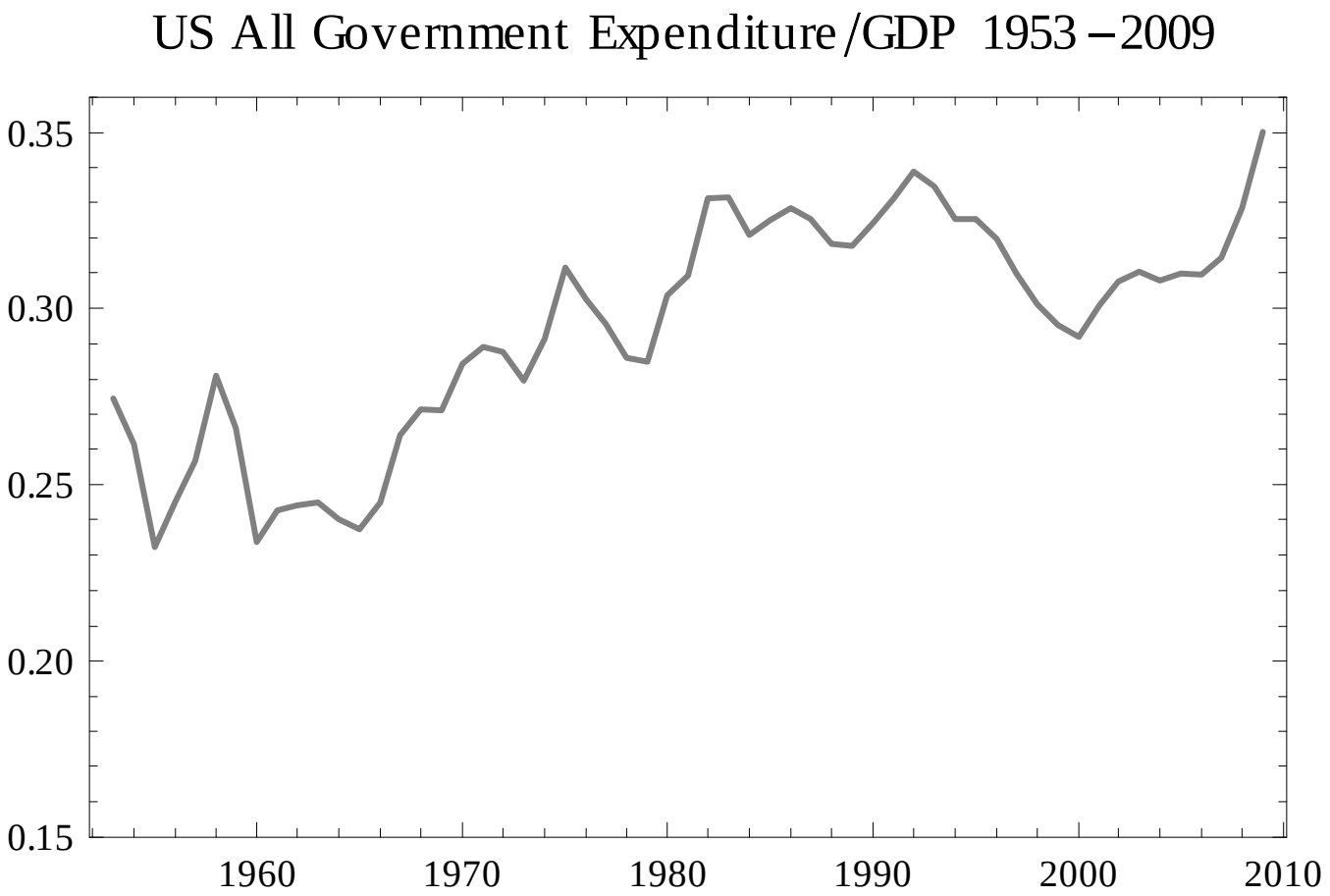

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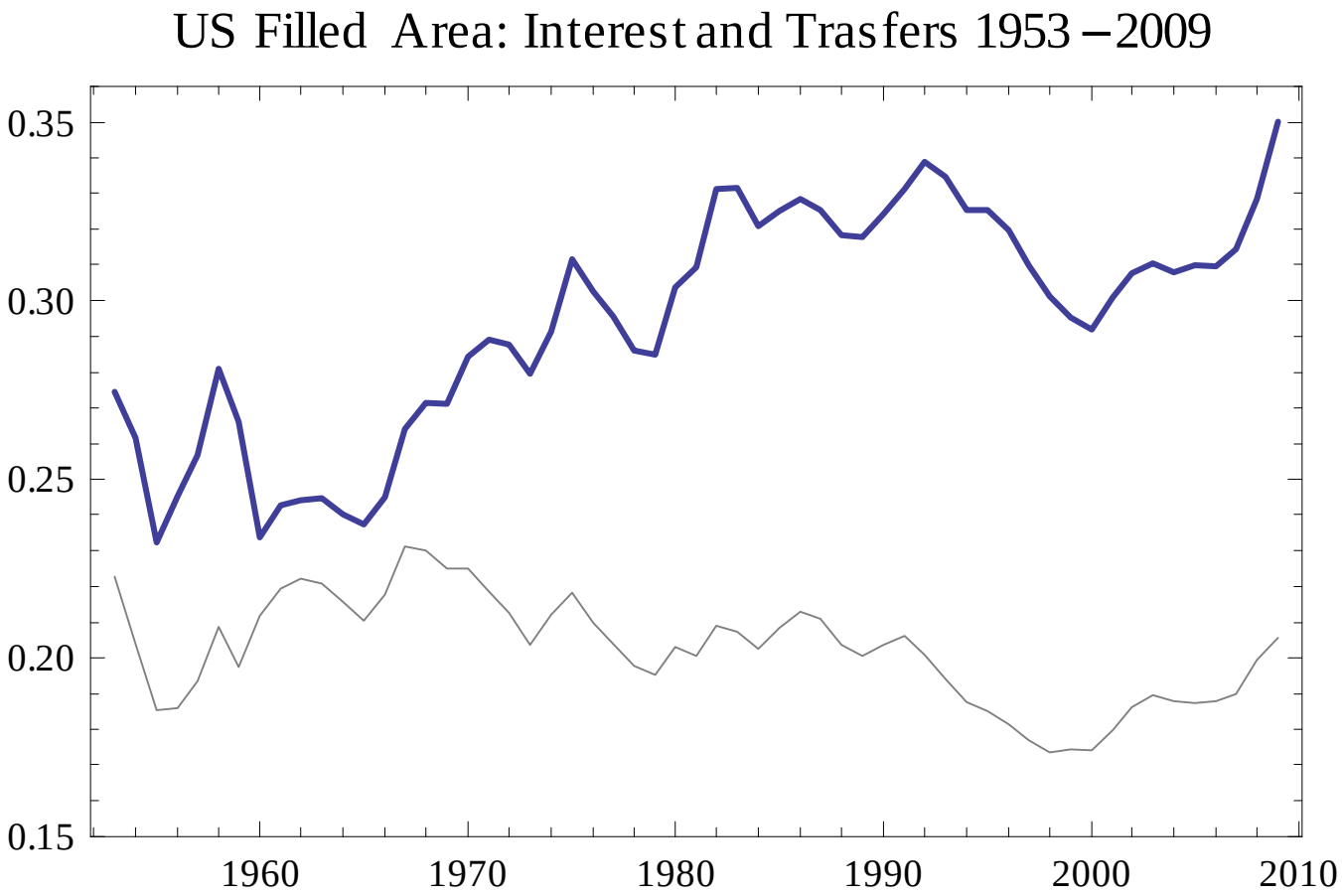

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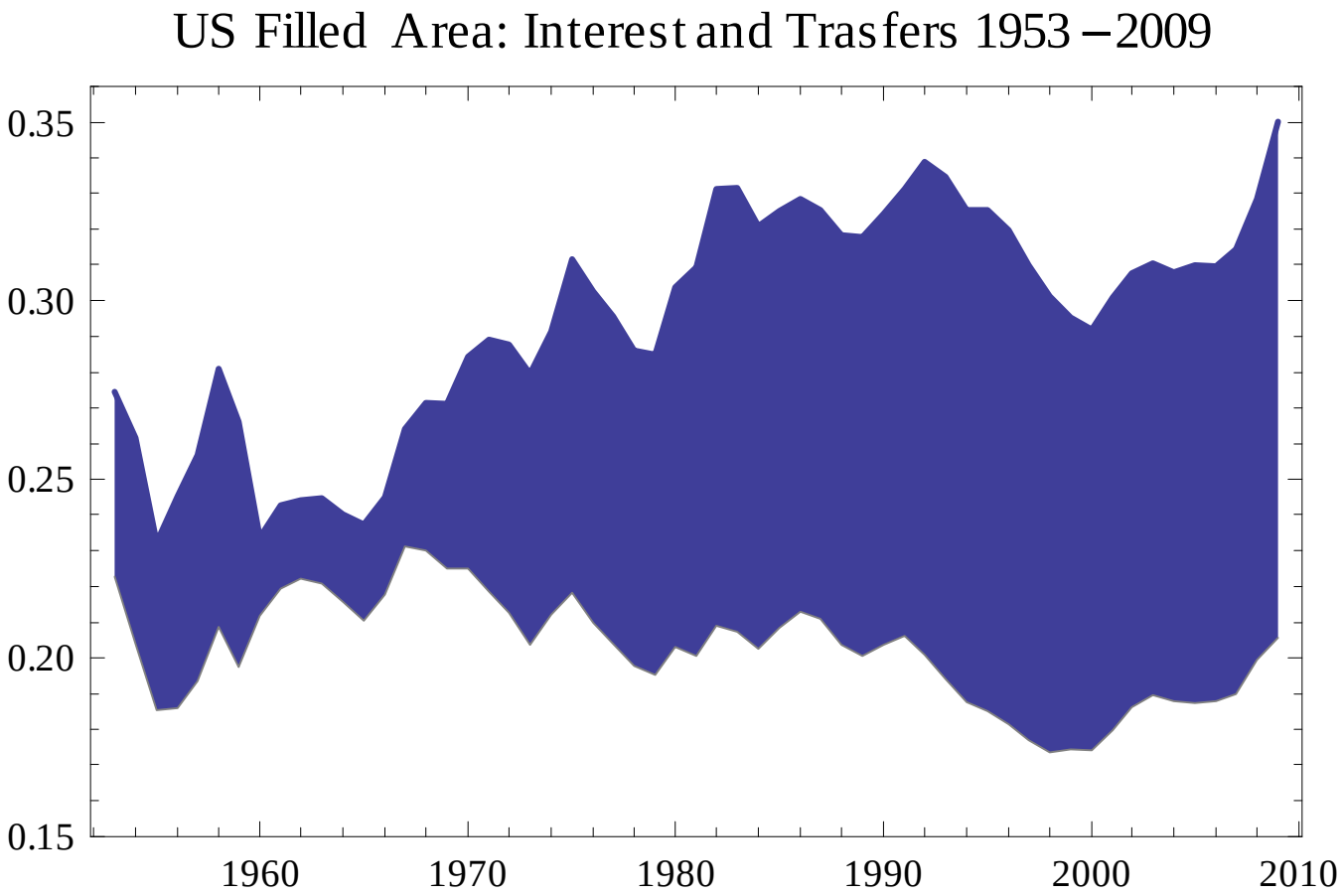

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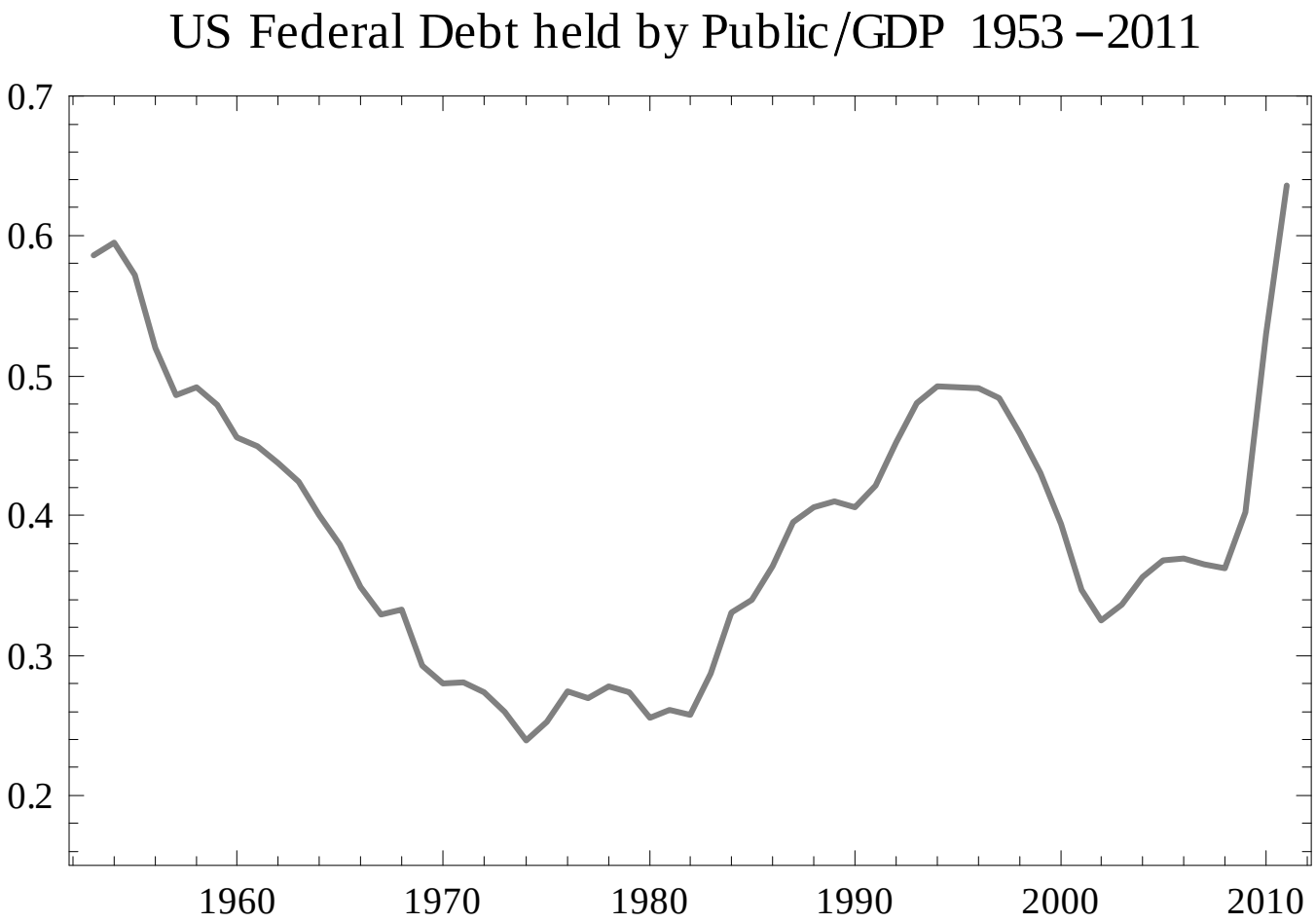

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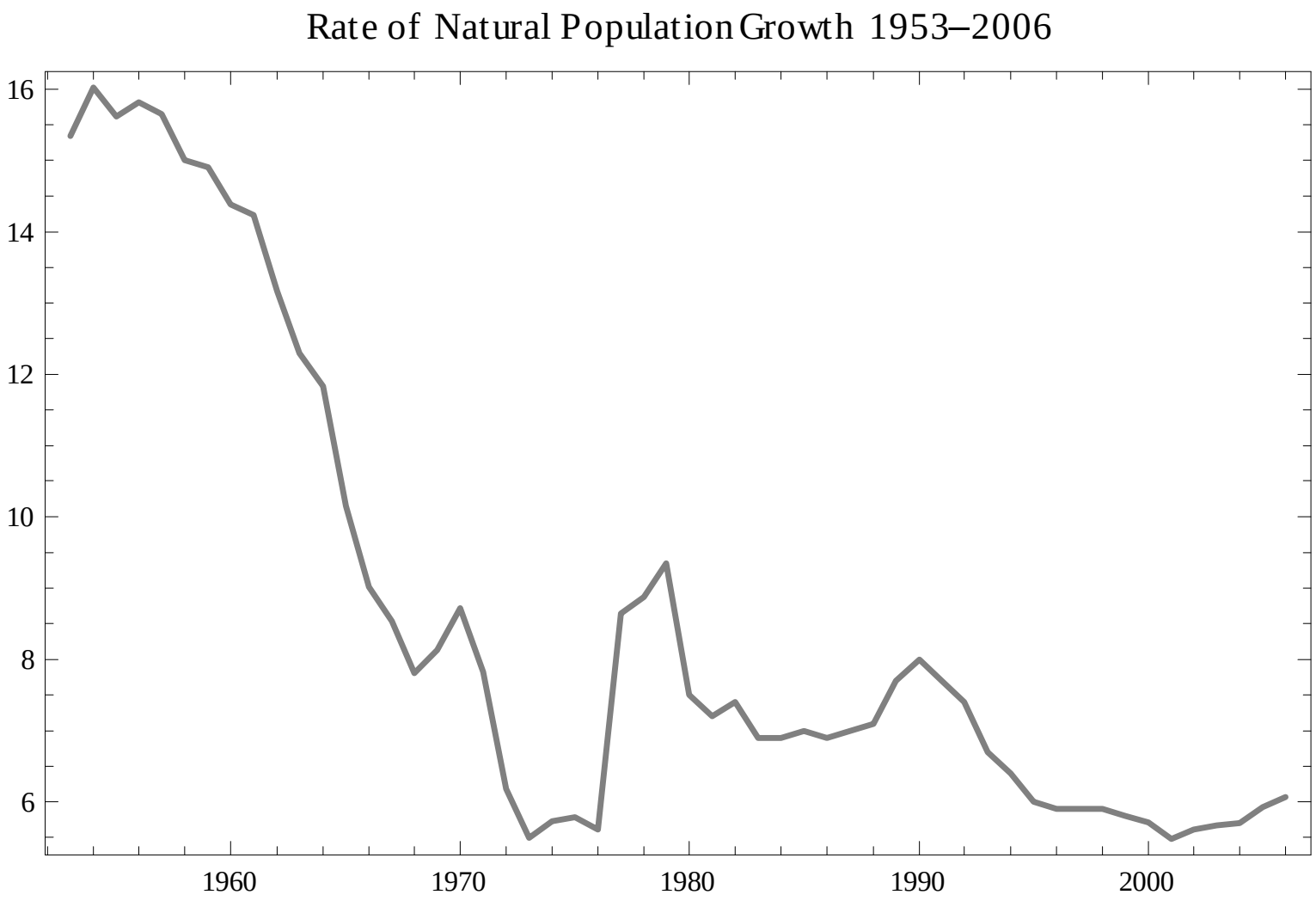

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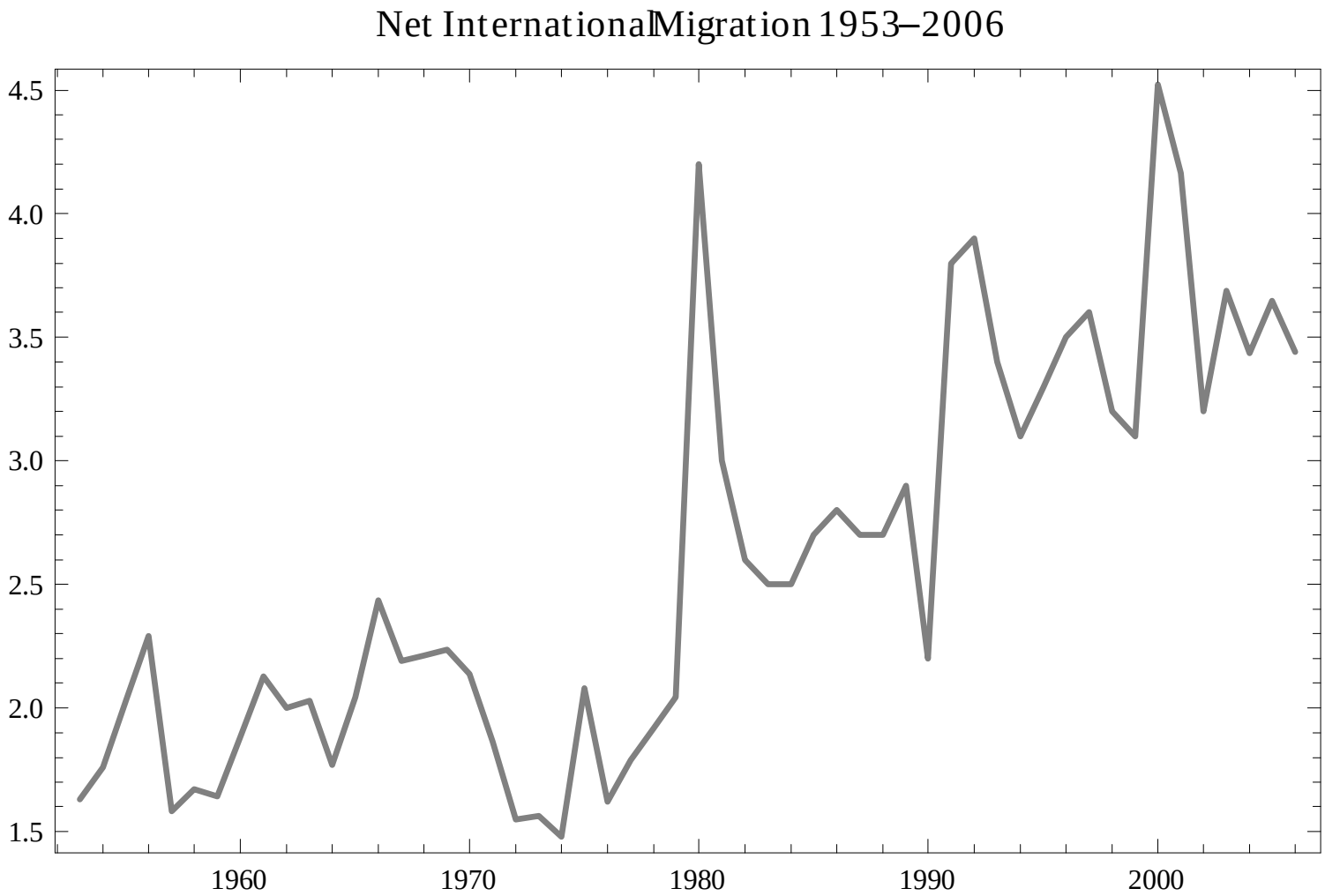

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- What is the most the native or currently resident population stand to gain from such policy changes?
- Is there any evidence in the historic record where large population movements inspired these types of policy shifts?
- Is there any evidence that large scale immigration may be influencing fiscal policy decisions today?

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- When looking for policies that provide the maximum benefit to the resident population and their descendents there is a tension between the redistribution of resources from future immigrants and the excess burden that affects everyone.

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- When looking for policies that provide the maximum benefit to the resident population and their descendents there is a tension between the redistribution of resources from future immigrants and the excess burden that affects everyone.
- The model I use is the optimal growth model with overlapping dynasties, calibrated using United States data for the years between 1953-2006.

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Benchmark: Optimal Fiscal Policy in Standard Optimal Growth Models with Representative Agents

- In a standard optimal growth model with representative agents and a fixed level of government expenditure:

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- In a standard optimal growth model with representative agents and government expenditure a fixed portion g of net output:
  - The Ramsey optimal fiscal policy is to set both the tax rate on capital and labour income equal to g.

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- Subsidizing capital or lowering the tax rate on capital income below its Ramsey optimal rate will raise both capital and long-run consumption
- However the short run loss in consumption along the transition path will harm overall welfare.
- Similarly, policies that do not smooth the tax burden over time, generate higher excess burdens.

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- In a model with immigration, along with the trade-off between the short-run there is an additional trade-off between present and future residents.

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- In a model with immigration, along with the trade-off between the short-run there is an additional trade-off between present and future residents.
- In any period the native population, or its representatives, must balance the excess burden generated by deviations from Ramsey optimal taxation or tax smoothing, against the benefits from shifting the tax burden towards households of immigrants that are yet to arrive.

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An Overlapping Dynasties Model

- Overlapping Dynasties Model—-Weil *JPubE* (1989), Ben-Gad *JEDC* (2004), Ben-Gad *RED* (2008)

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- New immigrant dynasties are joining the economy as workers, consumers and savers at a rate of $m(t)$.
- Hence there is no representative household and no full participation at any given moment.
- Each dynasty itself is growing at the rate of n due to natural population growth.

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- The overal size of the population is

$$P(t) = M(t_0)\, e^{n(t-t_0)+\int_{t_0}^{t} m(v)dv}$$

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An Overlapping Dynasties Model

- New immigrants are founding members of new infinite lived dynasties, each indexed by a value s, the date at which the dynasties' founding member crossed an international frontier, to instantaneously join the economy as a worker, consumer, and saver.

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- New immigrants are founding members of new infinite lived dynasties, each indexed by a value s, the date at which the dynasties' founding member crossed an international frontier, to instantaneously join the economy as a worker, consumer, and saver.
- The behavior of each new immigrant and all of his or her descendants can be characterized as the maximization of a dynasties' infinite horizon discounted utility function beginning at time s:

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An Overlapping Dynasties Model

$$\max_{c,h} \int_{s}^{\infty} e^{(\rho-n)(s-t)} \ln c\left(s,t\right) dt$$

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- subject to a time t budget constraint:
- $$\begin{aligned} \dot{a}(s,t) &= (1-\tau_h(t))\, w(t) h \\ &\quad + ((1-\tau_k(t))\, r(t) - n)\, a(s,t) - c(s,t) \;\forall s,t \end{aligned}$$

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- From the first order conditions:
  $c(s,u) = c(s,t)\, e^{(\rho-n)(t-u)} e^{\int_t^u ((1-\tau_k(v))r(v)-n)dv}$

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- $$c(s,t) = (\rho - n)\left(\omega(t) + a(s,t)\right) \quad \forall s,t.$$
- where $\omega(t) = \int_t^{\infty} e^{-\int_t^u ((1-\tau_k(v))r(v)-n)dv}\left[(1-\tau_h(u))w(u)h\right]du$ is the present discounted value of future labour income from time t forward.

An Overlapping Dynasties Model

- Aggregating across different households and accounting for natural population growth aggregate consumption, capital, public debt, present value of future labour income:

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$$C(t) = e^{n(t-t_0)} \int_{t_0}^{t} M(s)\, m(s)\, c(s,t) ds + e^{n(t-t_0)} M(t_0)\, c(t_0, t)$$

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$$B(t) = e^{n(t-t_0)} \int_{t_0}^{t} M(s)\, m(s)\, b(s,t) ds + e^{n(t-t_0)} M(t_0)\, b(t_0, t)$$

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- $$\Omega(t) = e^{n(t-t_0)} \left(\int_{t_0}^{t} M(s)\, m(s)\, ds + M(t_0) \right) \omega(t)$$

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An Overlapping Dynasties Model

- The law of motion for aggregate capital represents market clearing:

An Overlapping Dynasties Model

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  -

$$\begin{aligned}\dot{K}(t) &= (1-g(t))\left[F\left(K(t), z(t)H\right) - \delta K(t)\right] \\ &\quad -C(t) + e^{n(t-t_0)} M(t)\, m(t)\, k(t,t)\end{aligned}$$

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- where $g(t)$ is the share of net output that funds government consumption, and $z(t)$, growing at the constant rate of x is an exogenous technology level that generates steady state growth.

An Overlapping Dynasties Model

- The law of motion for government debt represents the government budget constraint:

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-

$$\begin{aligned}\dot{B}(t) &= g(t)\left[F\left(K(t), z(t)H\right) - \delta K(t)\right] \\ &\quad -\tau_h(t)w(t)h - \tau_k(t)r(t)\left[K\left(t\right) + B\left(t\right)\right] + r(t)B(t)\end{aligned}$$

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$$
\begin{aligned}
B(t) \;=\; & \int_t^{\infty} \tau_h(u) w(u) H e^{-\int_t^u ((1-\tau_k(v))r(v)-n)dv}\, du \\
& + \int_t^{\infty} \tau_k(u) r(u) K(t)\, e^{-\int_t^u ((1-\tau_k(v))r(v)-n)dv}\, du \\
& - \int_t^{\infty} g(u) F\left(K(u), z(u)H\right) e^{-\int_t^u ((1-\tau_k(v))r(v)-n)dv}\, du \\
& + \delta \int_t^{\infty} g(u) K(u) e^{-\int_t^u ((1-\tau_k(v))r(v)-n)dv}\, du \\
& - n \int_t^{\infty} e^{-\int_t^u ((1-\tau_k(v))r(v)-n)dv} B(u)\, du
\end{aligned}
$$

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An Overlapping Dynasties Model

- Aggregating over all dynasties and differentiating the consumption rule with respect to t, aggregate consumption evolves over time according to:

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$$\begin{aligned}\dot{C}(t) &= [(1-\tau_k)\, r(t) - \rho]\, C(t) \\ &\quad + (m(t)+n)\, C(t) - (\rho - n)\, m(t)\, B(t) \\ &\quad + (\rho - n) \Big(e^{n(t-t_0)} m(t)\, M(t)\, k(t,t) - m(t)\, K(t) \\ &\quad + g(t) \left[F\left(K(t), z(t)H\right) - \delta K(t) \right] \\ &\quad - \tau_h(t) w(t) H - \tau_k(t) r(t) K(t) \Big)\end{aligned}$$

An Overlapping Dynasties Model

- After re-writing the variables in per-capita, stationary terms:

An Overlapping Dynasties Model

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$$\begin{aligned}\dot{\widetilde{c}}(t) &= \left[(1-\tau_k)\, r(t) - \rho - x\right]\widetilde{c}(t) \\ &\quad + (\rho - n)\left[g(t)\left[F\left(\tilde{k}(t), h\right) - \delta k(t)\right] - \tau_h(t)\tilde{w}(t)h\right. \\ &\quad \left. -\tau_k(t) r(t)\tilde{k}(t) - m(t)\left(\tilde{b}(t) + \kappa(t)\tilde{k}(t)\right)\right]\end{aligned}$$

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$$\begin{aligned}\dot{\tilde{b}}(t) &= g(t)\left[F\left(\tilde{k}(t), h\right) - \delta\tilde{k}(t)\right] - \tau_h(t)\tilde{w}(t)h \\ &\quad -\tau_k(t) r(t) \tilde{k}(t) + (1-\tau_k(t))\, r(t)\widetilde{b}(t) \\ &\quad -(n + x + m(t))\, \widetilde{b}(t)\end{aligned}$$

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$$\begin{aligned}\dot{\tilde{b}}(t) &= g(t)\left[F\left(\tilde{k}(t), h\right) - \delta\tilde{k}(t)\right] - \tau_h(t)\tilde{w}(t)h \\ &\quad -\tau_k(t) r(t) \tilde{k}(t) + (1-\tau_k(t))\, r(t)\widetilde{b}(t) \\ &\quad - (n + x + m(t))\, \widetilde{b}(t)\end{aligned}$$
-
$$\begin{aligned}\dot{\widetilde{k}}(t) &= (1-g(t))\left[F\left(\widetilde{k}(t), h\right) - \delta\widetilde{k}(t)\right] - \widetilde{c}(t) \\ &\quad - (x + n + m(t)\,\kappa(t))\, \widetilde{k}(t)\end{aligned}$$

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An Overlapping Dynasties Model

- Factor returns are equal to their marginal products:

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- $$\tilde{w}(t) = F_h\left(\widetilde{k}(t), h\right)$$
- The production function is Cobb-Douglas:
  $F\left(\widetilde{k}(t), h\right) = \widetilde{k}(t)^{\alpha} h^{1-\alpha}$

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Calibrating the Model

- I calibrate the model using the techniques in Cooley and Prescott (1995) and Gomme and Rupert (2007) with United States data for the years 1953-2006.

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-
$$\rho = \frac{\left[\left(1-\tau_k\right)r - x\right]\frac{\widetilde{c}}{\widetilde{y}} + nm\left[\frac{\widetilde{b}}{\widetilde{y}} + \frac{\widetilde{k}}{\widetilde{y}}\kappa\right]}{m\frac{\widetilde{b}}{\widetilde{y}} + m\frac{\widetilde{k}}{\widetilde{y}}\kappa + \frac{\widetilde{c}}{\widetilde{y}}}$$

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- Tax rate on households:

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- $$\tau_k = \frac{\text{Capital Taxes Paid}}{\text{Net Operating Surplus- }\left(1-\alpha\right)\left(\text{Prop. Inc.}\right)}$$

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Impulse Responses

- Starting from baseline rate of capital tax of 0.295, and rate of immigration of 2.6 per thousand, suppose the budget remains balanced, but tax on capital drops from 0.295 to 0.212.

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- Using a fourth order perturbations approximation I calculate what happens to per-capita consumption, net factor returns and the consumption enjoyed by the households resident in the economy at the time of the policy change.

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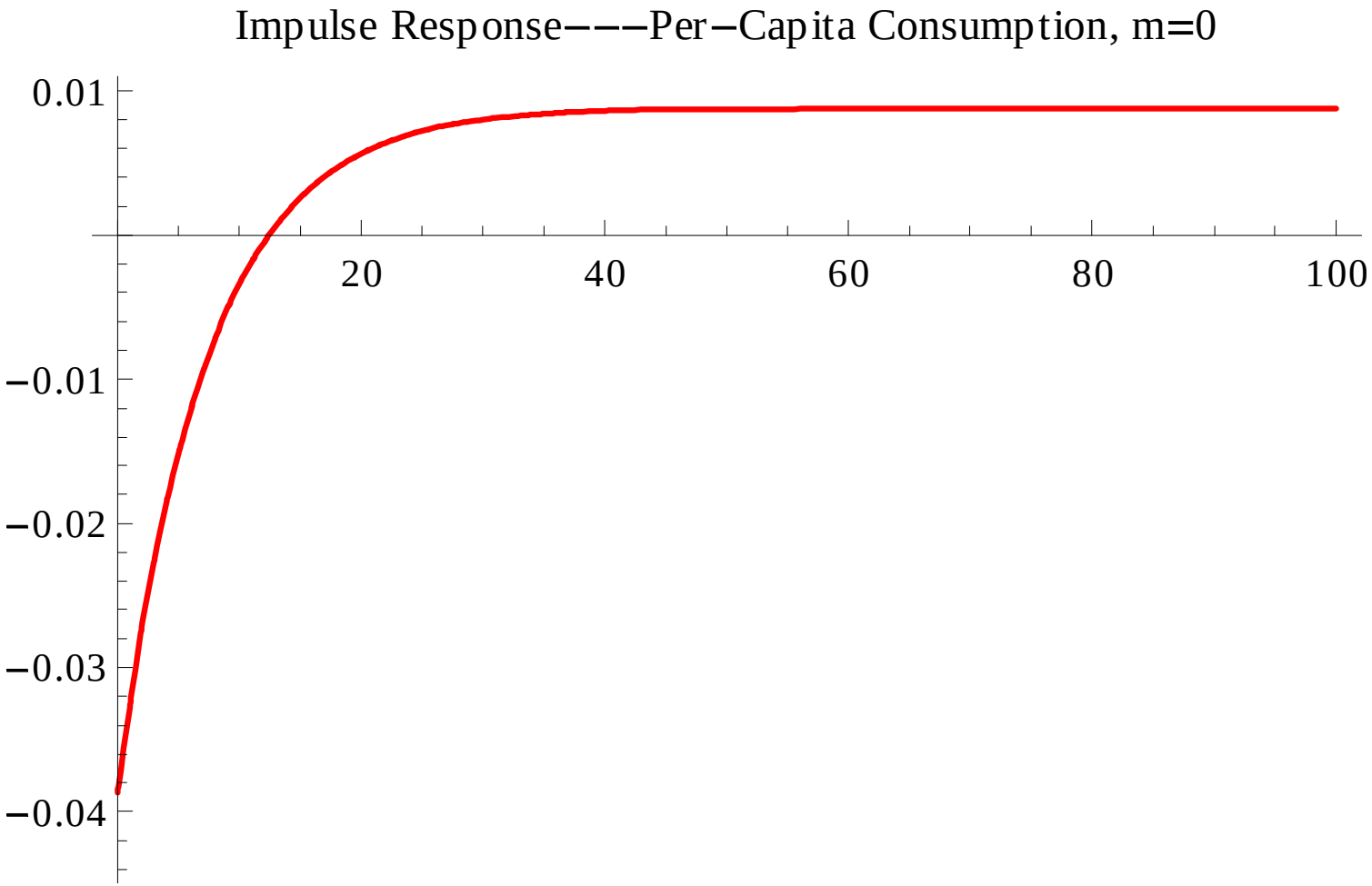
Lowering the Tax on Capital from 0.295 to 0.212



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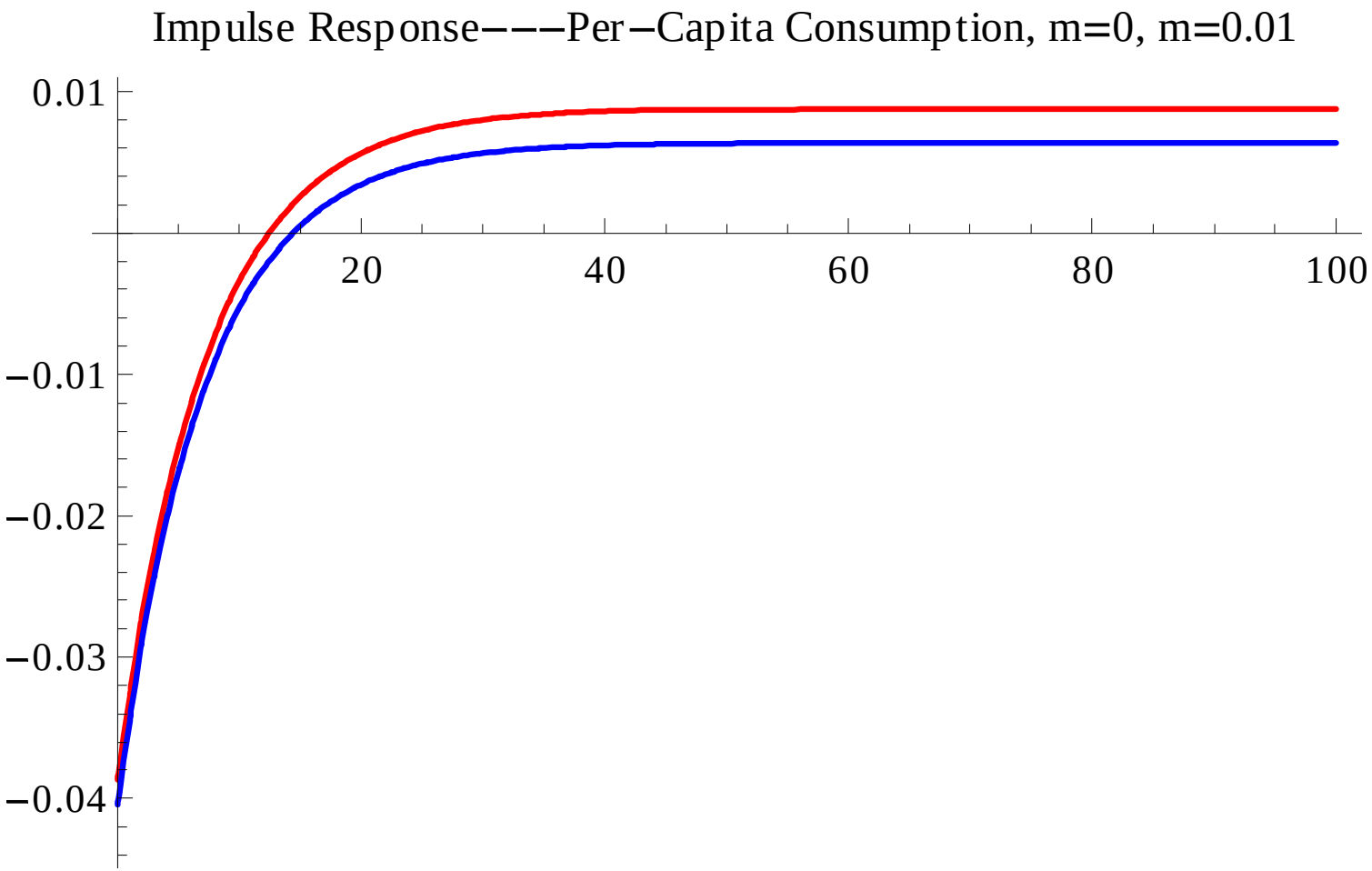
Lowering the Tax on Capital from 0.295 to 0.212



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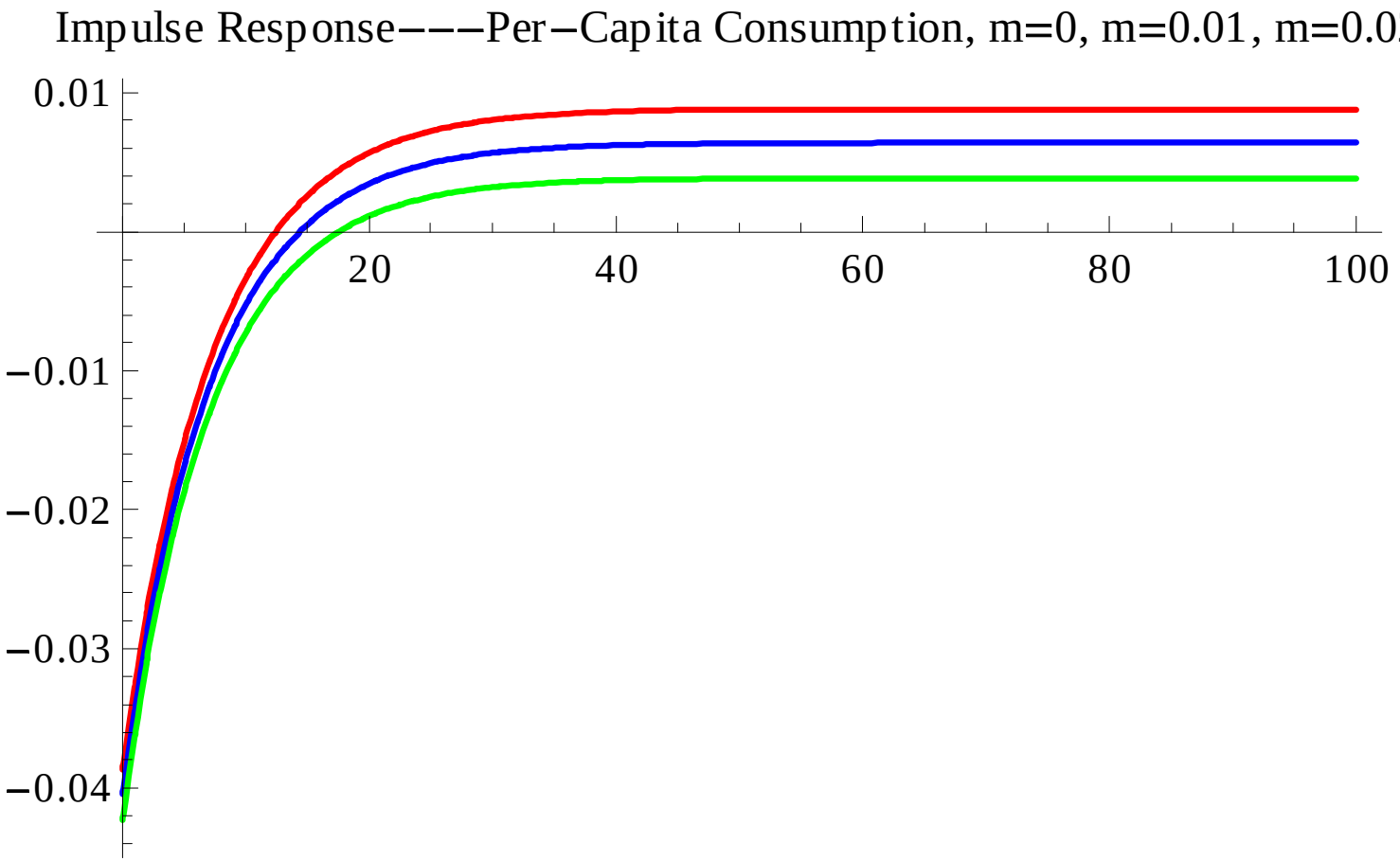
Lowering the Tax on Capital from 0.295 to 0.212



CITY UNIVERSITY LONDON

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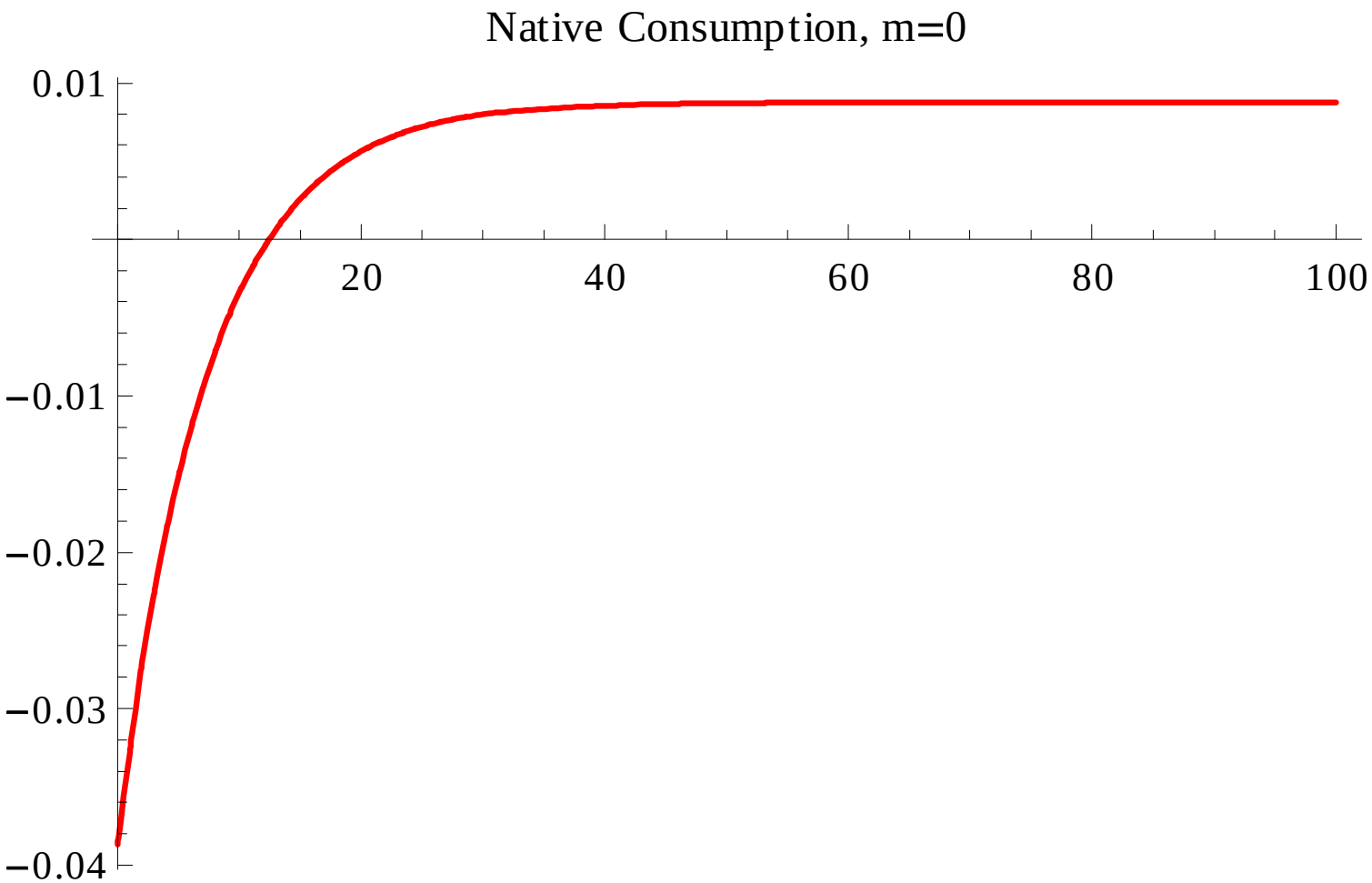

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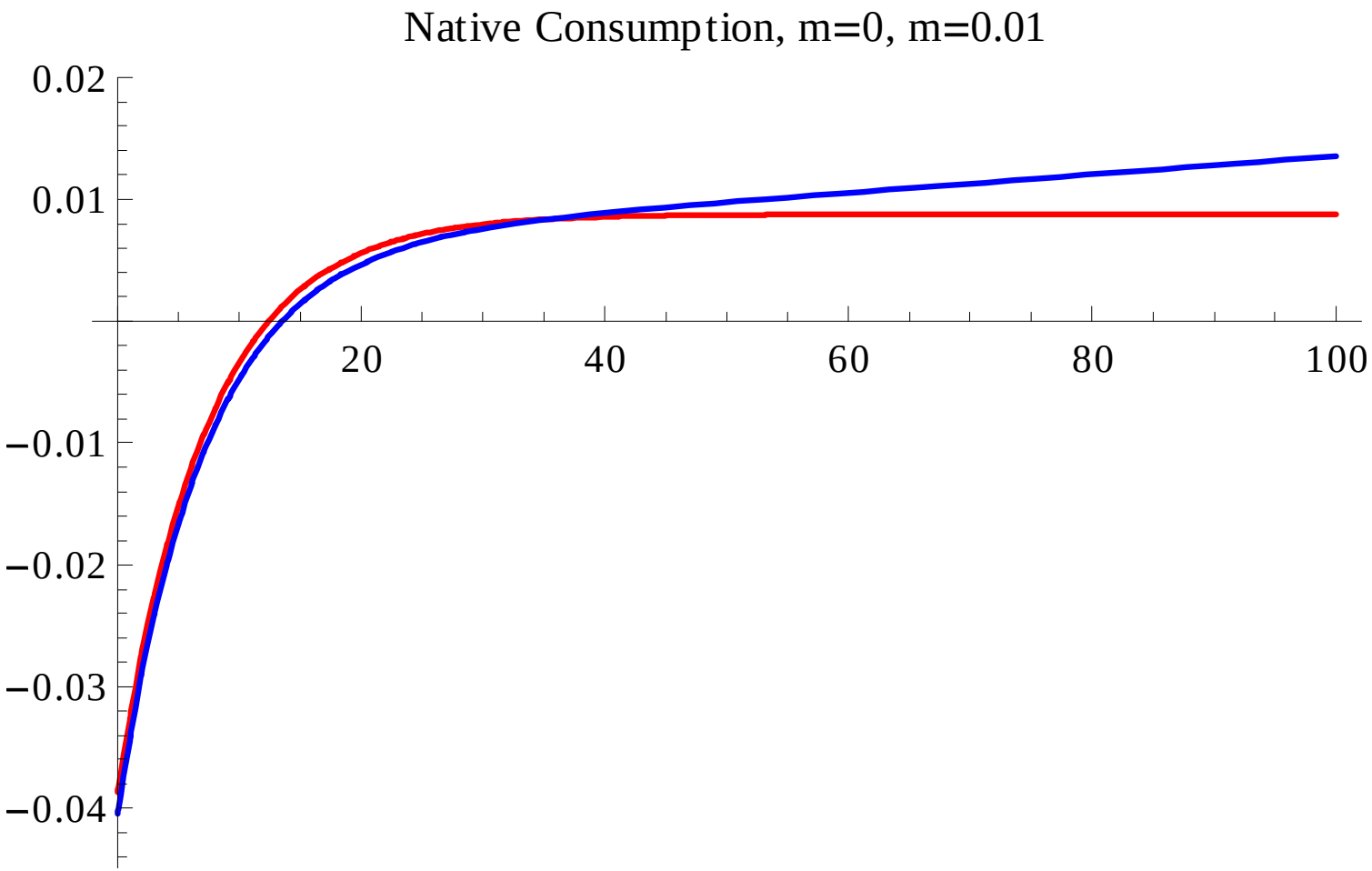

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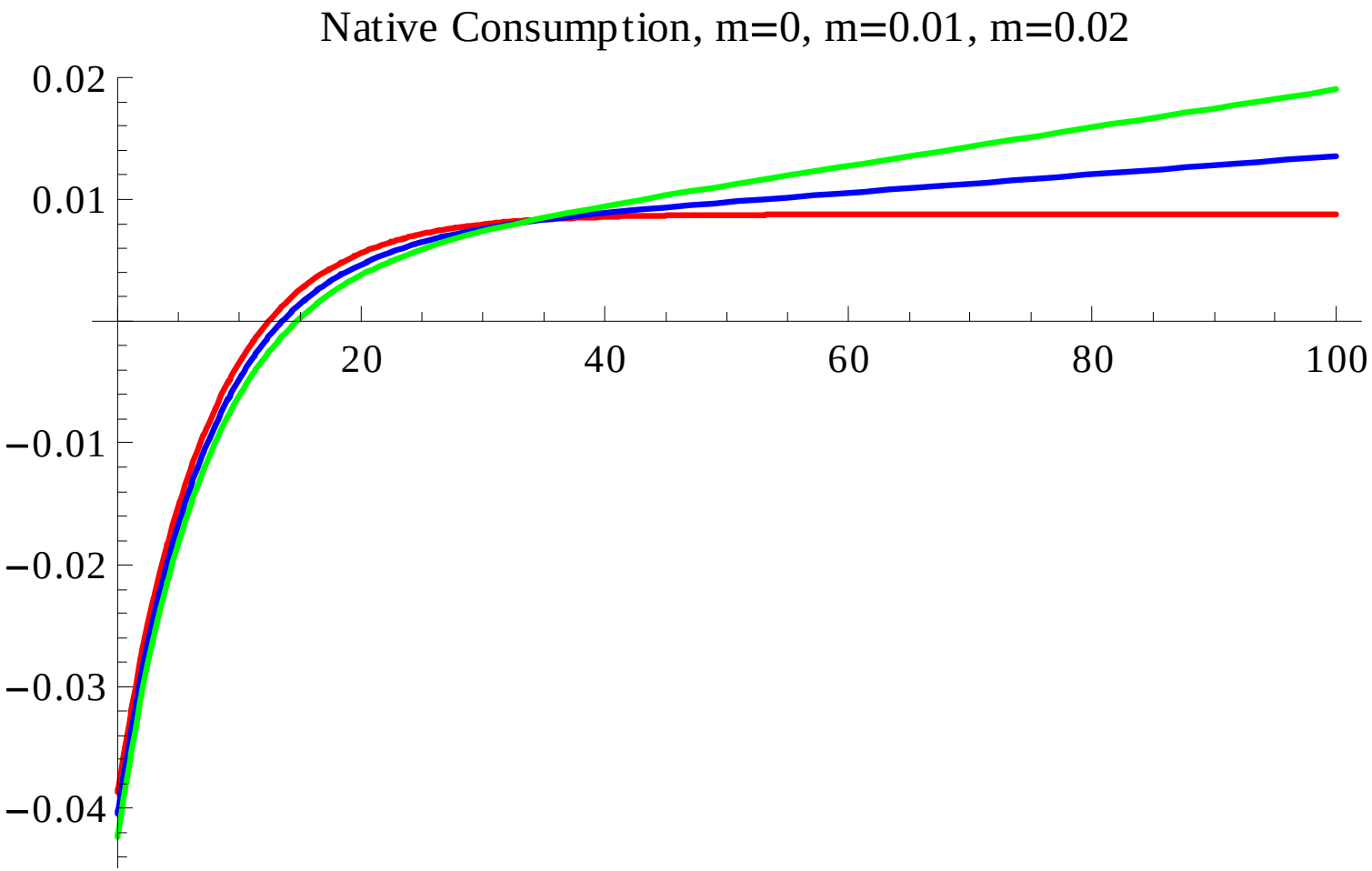

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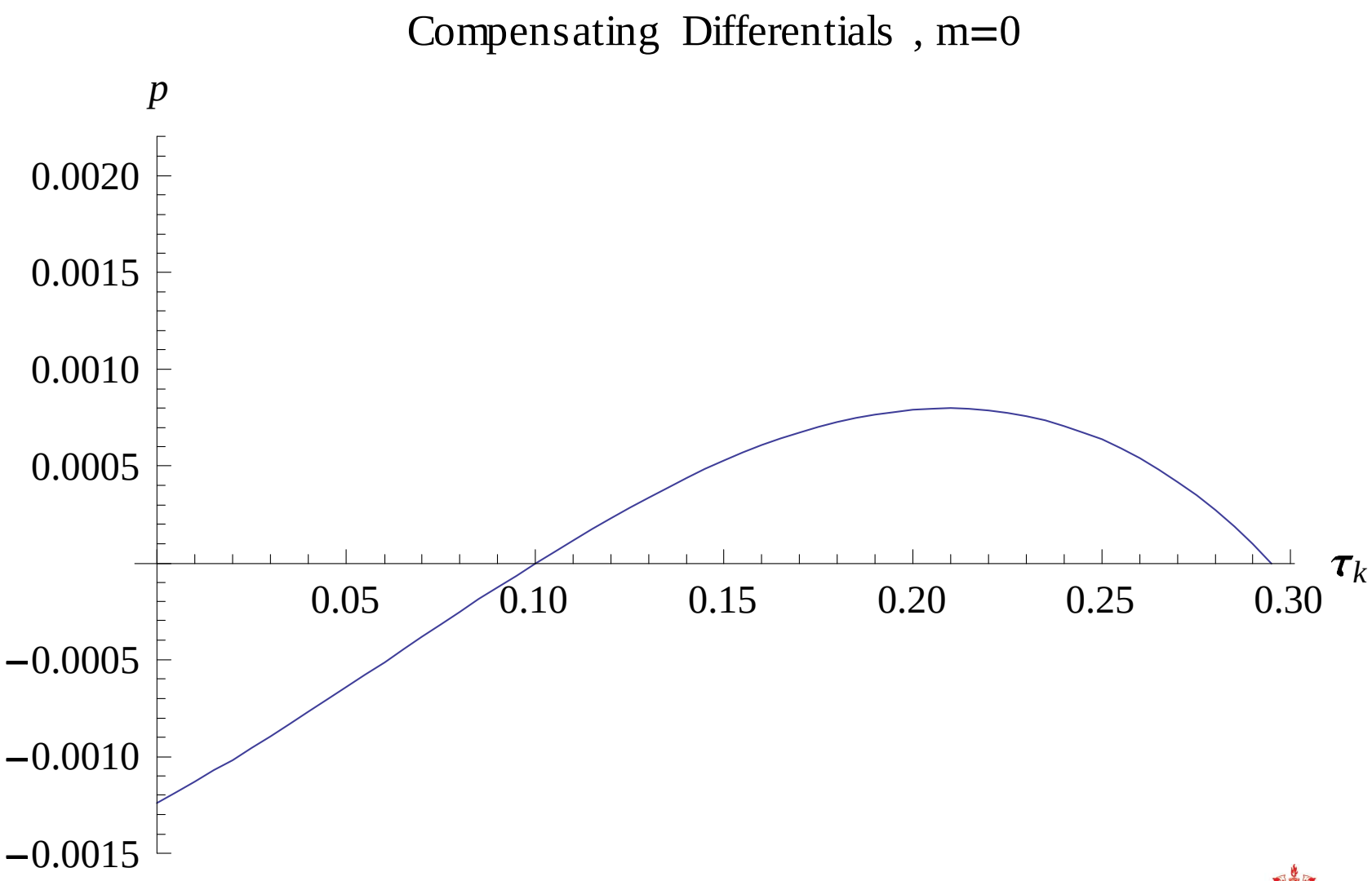
How will this policy affect the welfare of the native population, those present at the time the policy is announced?
I calculate compensating differentials, the fractional increase in the initial counterfactual path of consumption $\overline{c}(0,t)$:

$$\int_0^\infty e^{(n-\rho)t} \ln c\,(0,t)\,dt = \int_0^\infty e^{(n-\rho)t} \ln\left[(1+p)\,\overline{c}(0,t)\right] dt$$

Substituting: $c\,(s,u) = c\,(s,t)\,e^{(\rho-n)(t-u)}e^{\int_t^u((1-\tau_k(v))r(v)-n)dv}$ and solving for p:

$$p = -1 + \overline{c}(0,0)^{\frac{\rho-n}{n+\bar{r}}}\,c\,(0,0)\,e^{(\rho-n)\int_0^\infty e^{(n-\rho)t}\int_0^t((1-\tau_k(v))r(v)-\rho)dvdt}$$

Welfare Analysis



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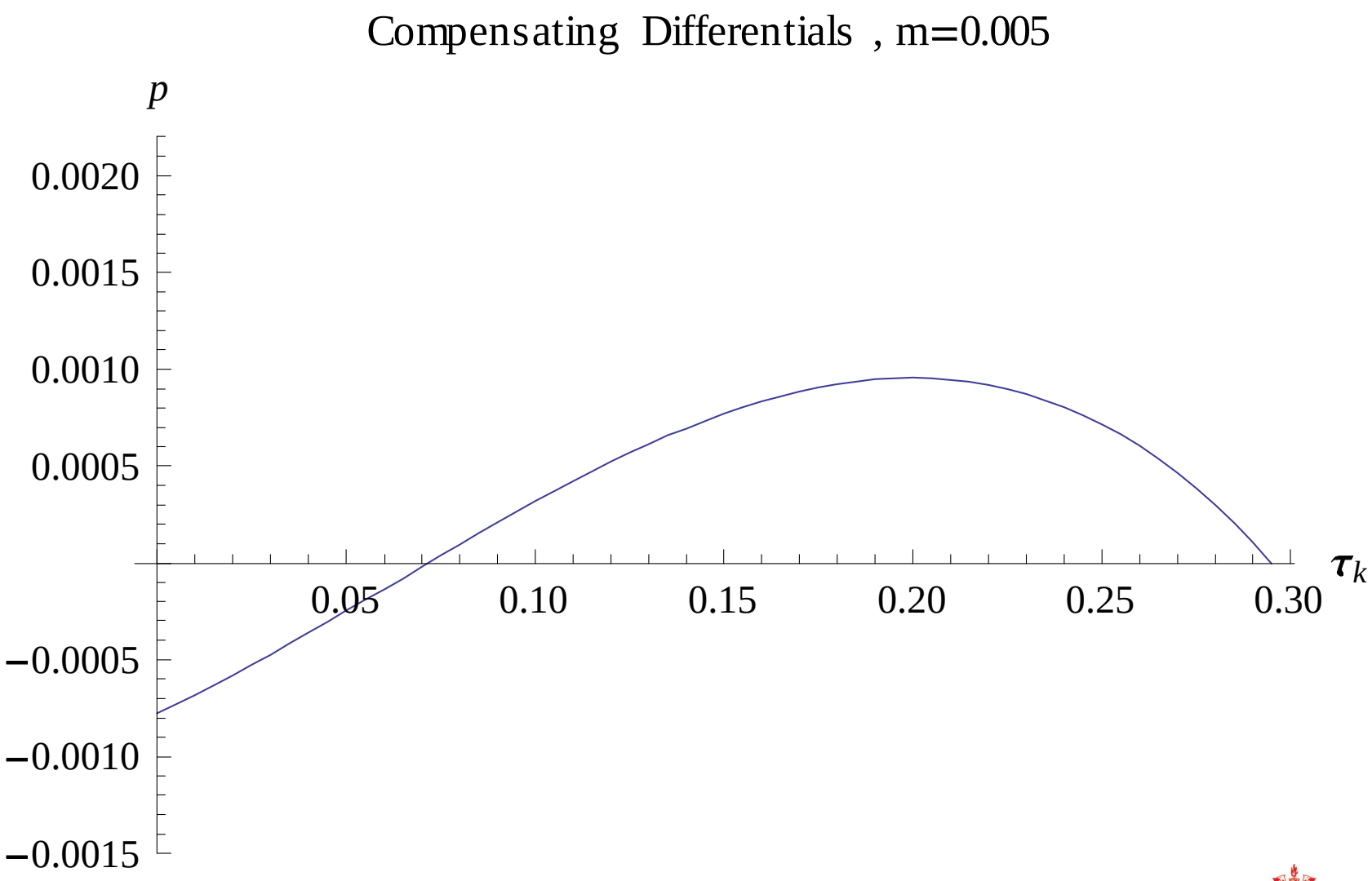

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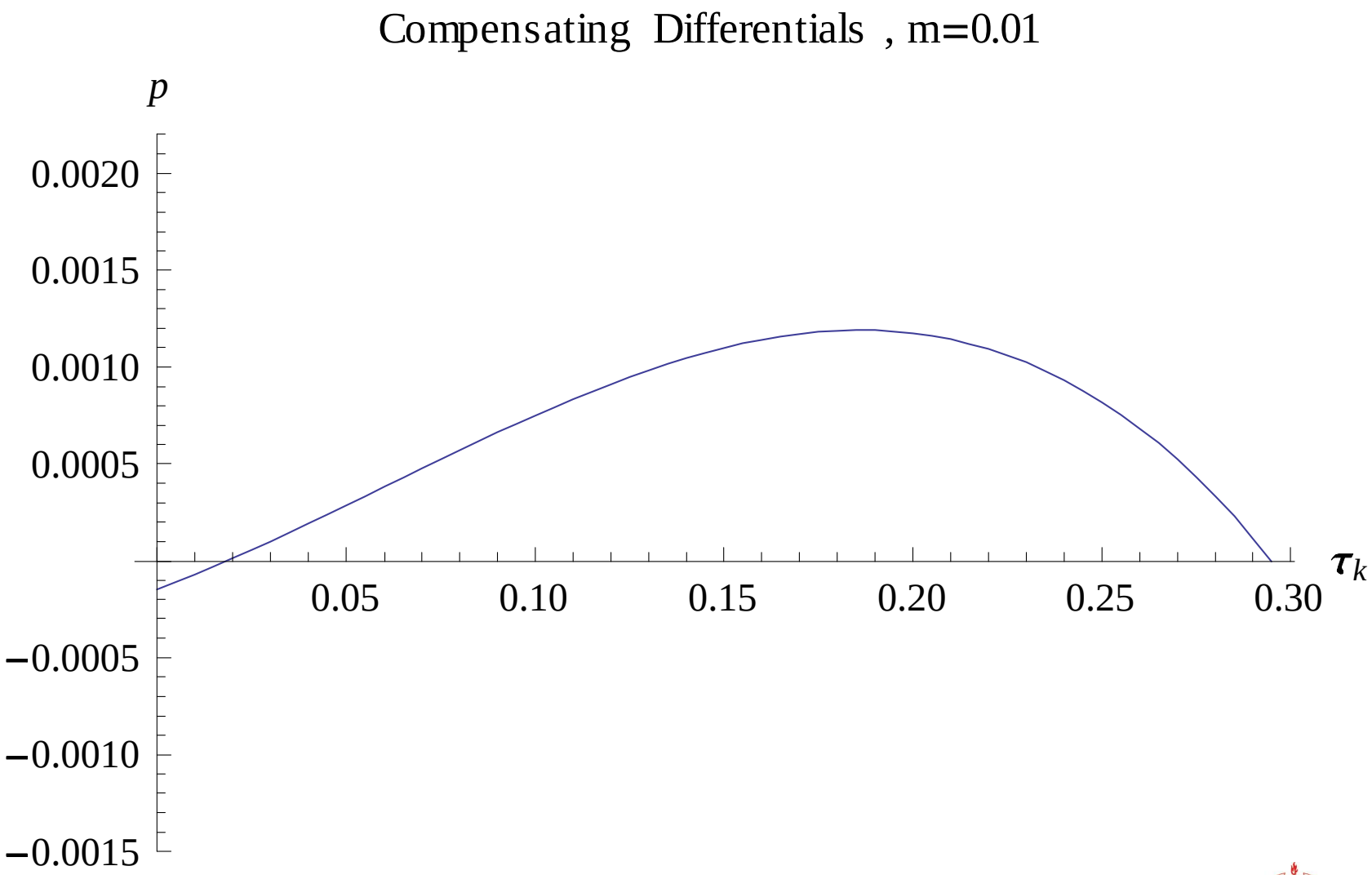
Welfare Analysis



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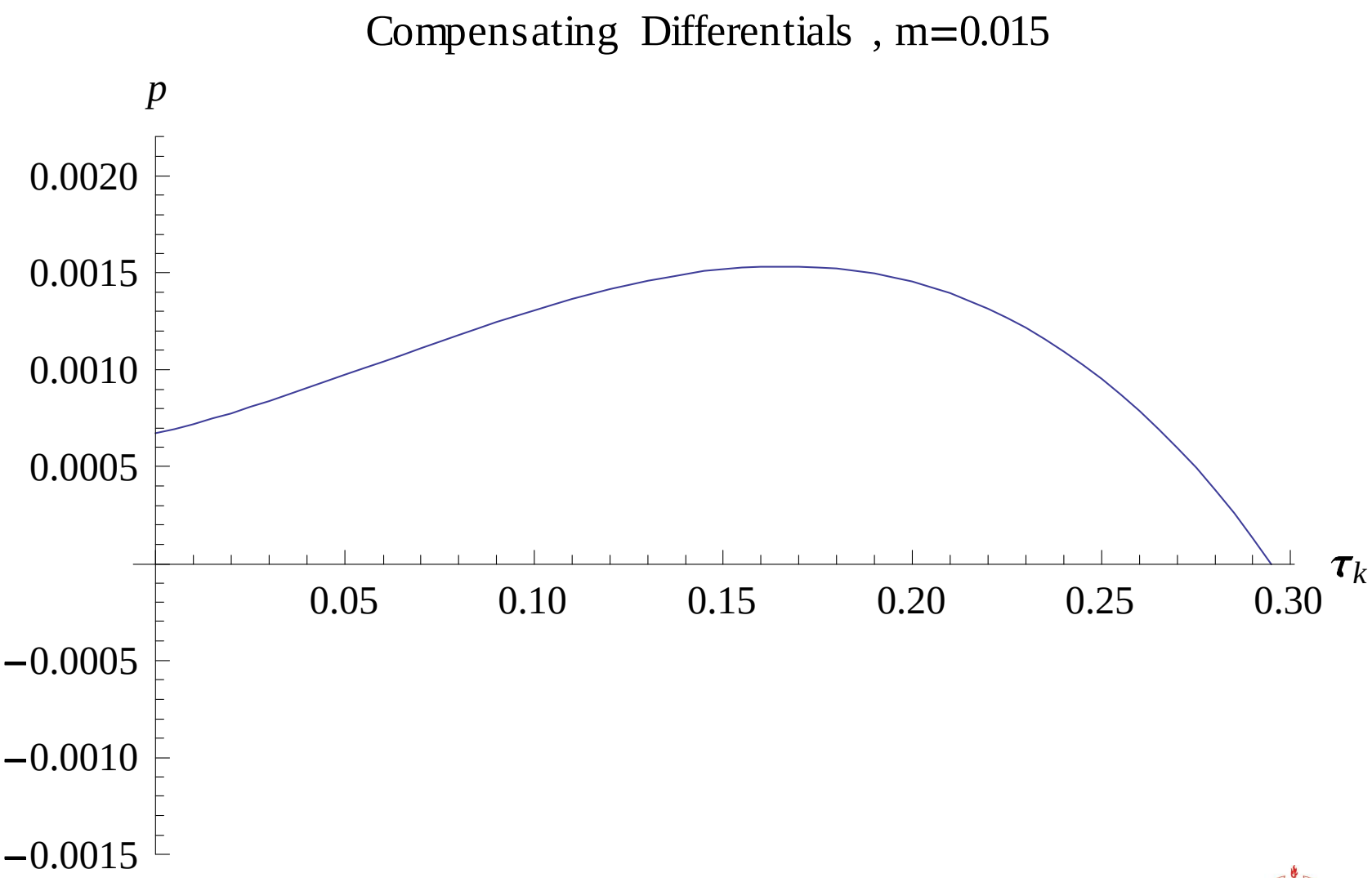

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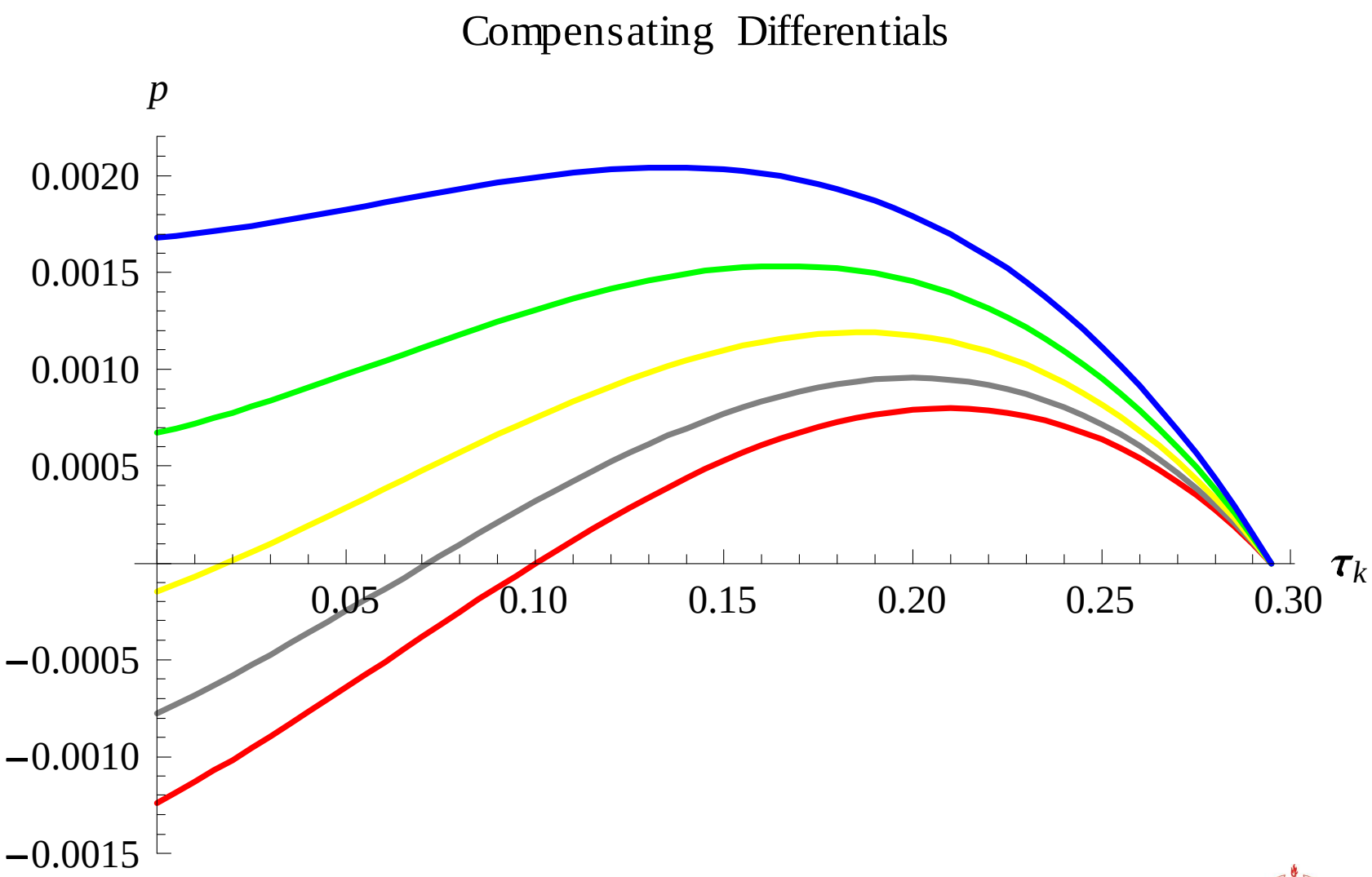

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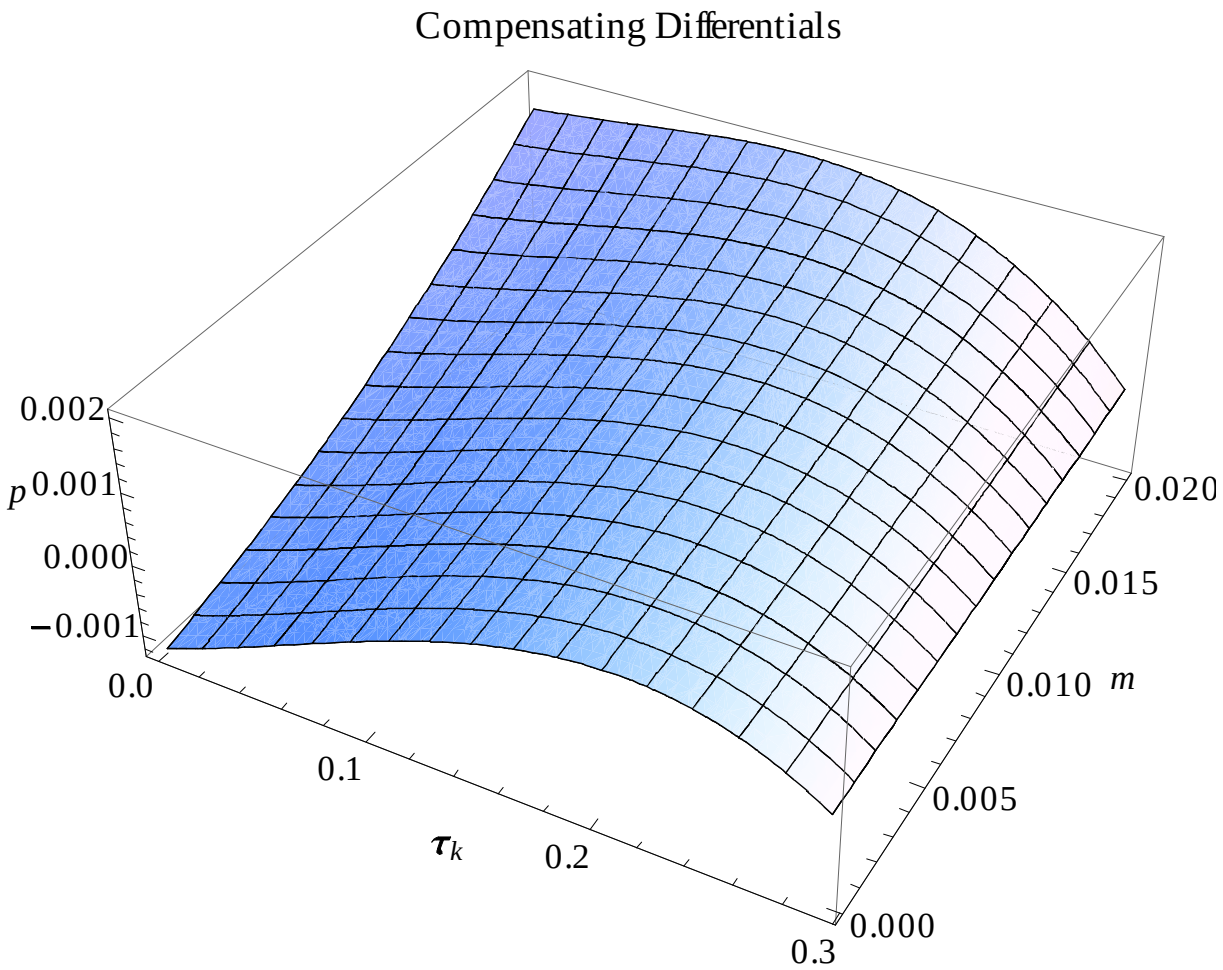

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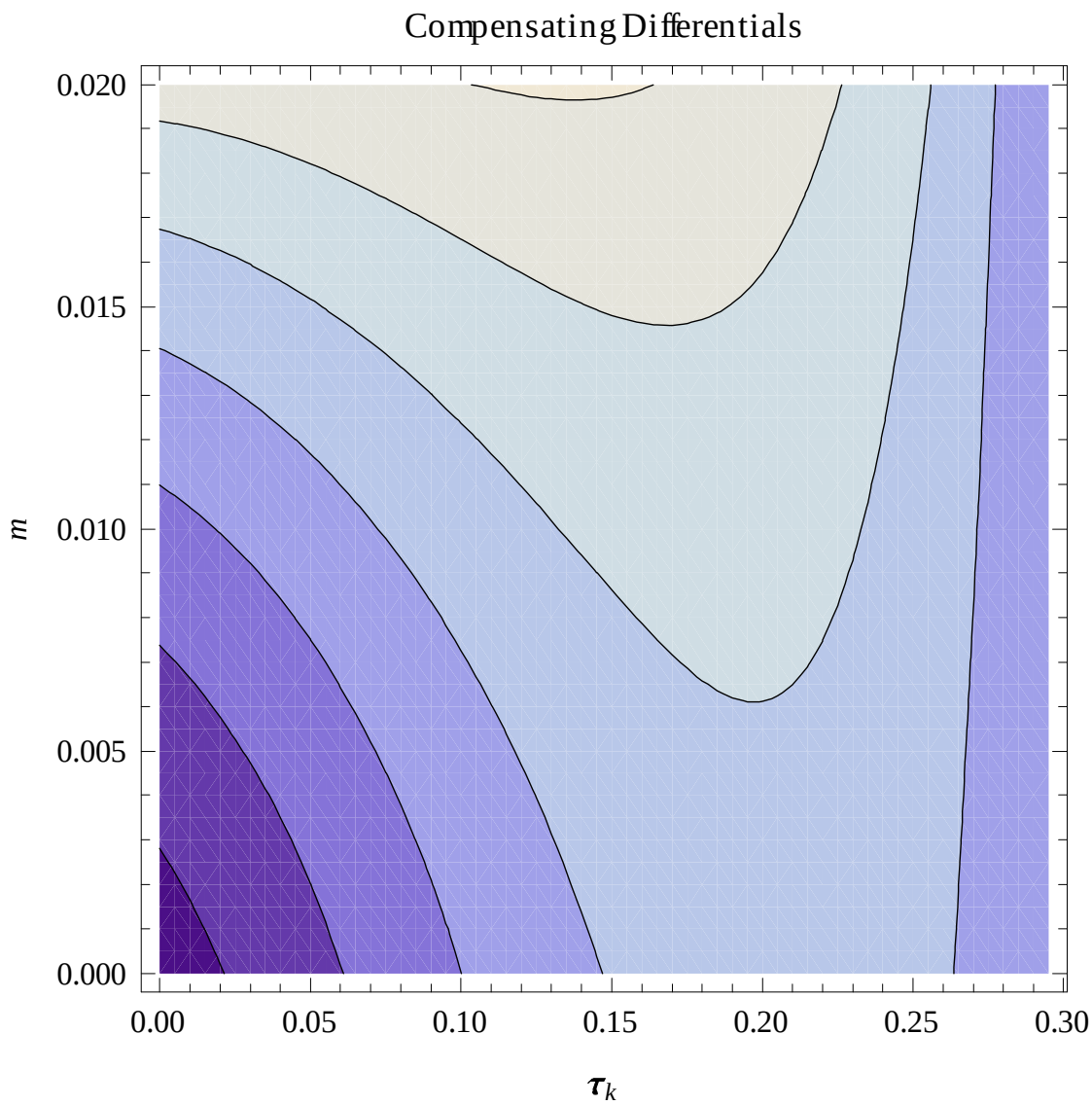

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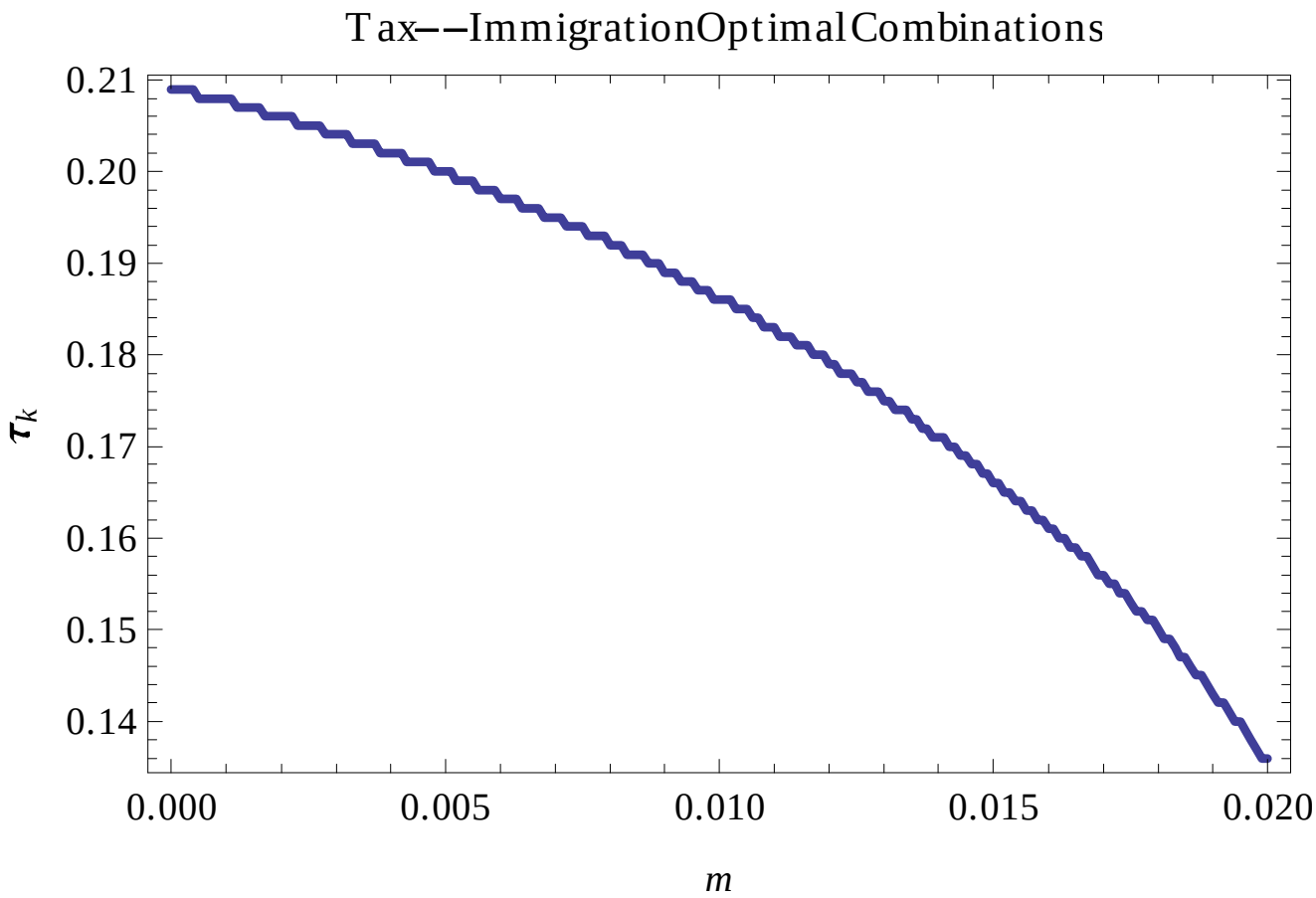

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Welfare Analysis

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  - Higher immigration lowers the optimal tax prefered by the native population, though not by very much.

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  - Higher immigration lowers the optimal tax prefered by the native population, though not by very much.
  - The benefit from shifting the burden of taxation from capital to labour is small, and quickly overwhelmed by the rise in deadweight loss.

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Deficit Spending

- Suppose instead of shifting the tax burden from capital to labour, the government shifts its forward in time

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- Wage on taxes initially drop (transfer payments rise).
- Future taxes on capital are permanently higher so that the intertemporal budget constraint is satisfied:

Deficit Spending

$$
\begin{aligned}
B(t) \quad = \quad & \int_t^{\infty} \tau_h(u) w(u) H e^{-\int_t^u ((1-\tau_k(v))r(v)-n)dv} du \\
& + \int_t^{\infty} \tau_k(u) r(u) K(t) e^{-\int_t^u ((1-\tau_k(v))r(v)-n)dv} du \\
& - \int_t^{\infty} g(u) F(K(u), z(u)H) e^{-\int_t^u ((1-\tau_k(v))r(v)-n)dv} du \\
& + \delta \int_t^{\infty} g(u) K(u) e^{-\int_t^u ((1-\tau_k(v))r(v)-n)dv} du \\
& - n \int_t^{\infty} e^{-\int_t^u ((1-\tau_k(v))r(v)-n)dv} B(u) du
\end{aligned}
$$

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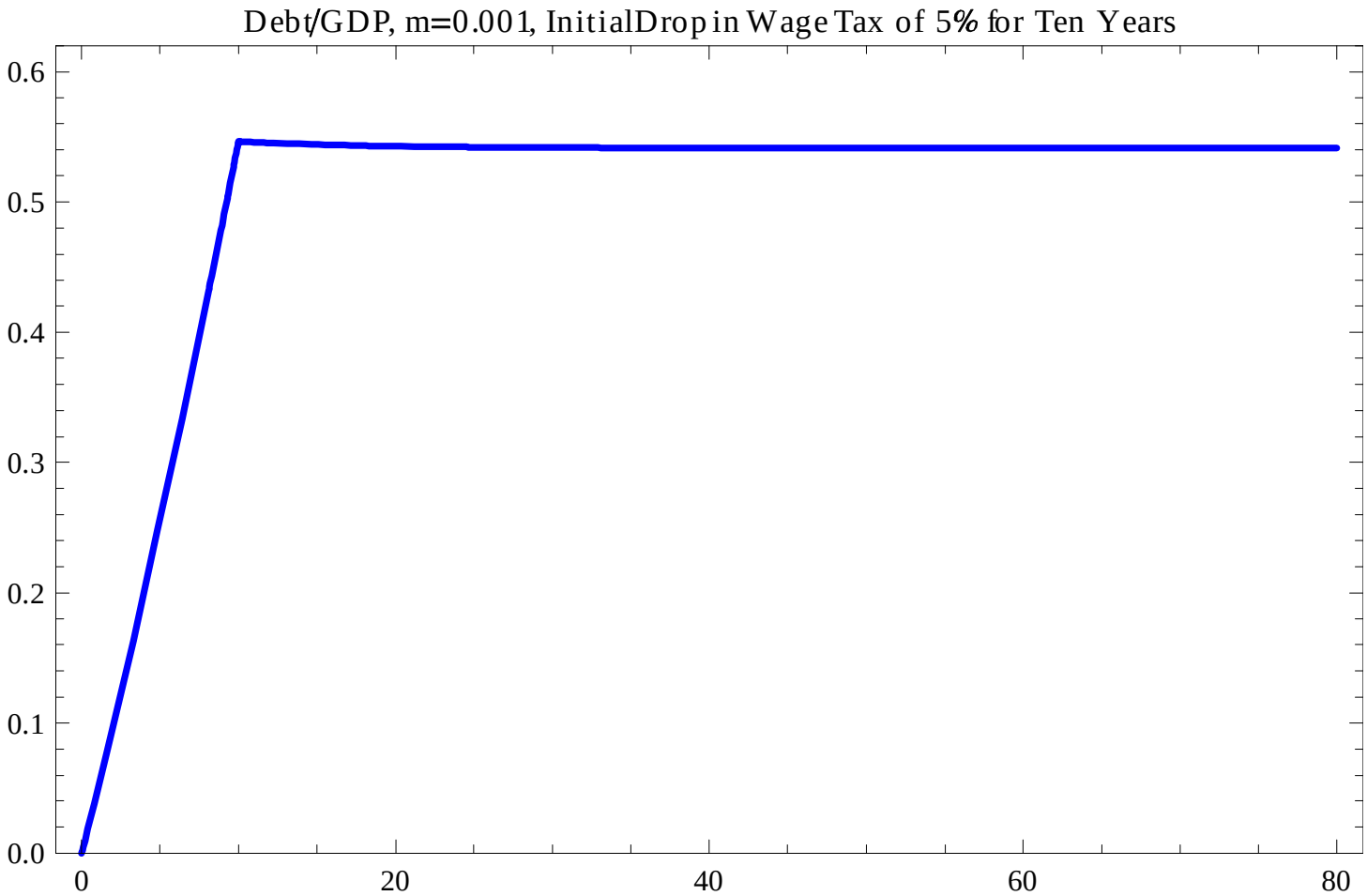
Lower Wage Taxes Five Percent for Ten Years with Immigration at 1 per 1000



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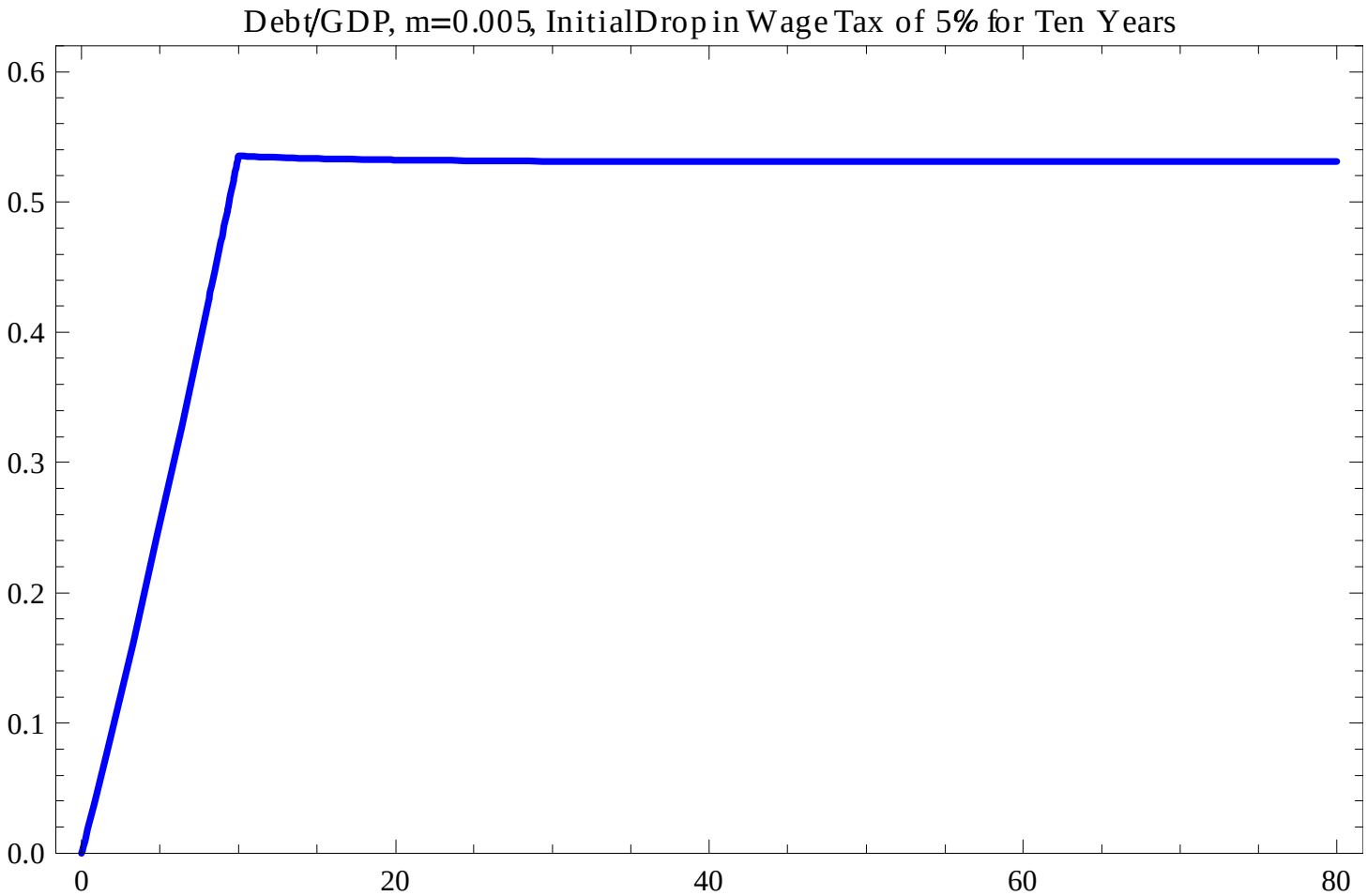
Lower Wage Taxes Five Percent for Ten Years with Immigration at 5 per 1000



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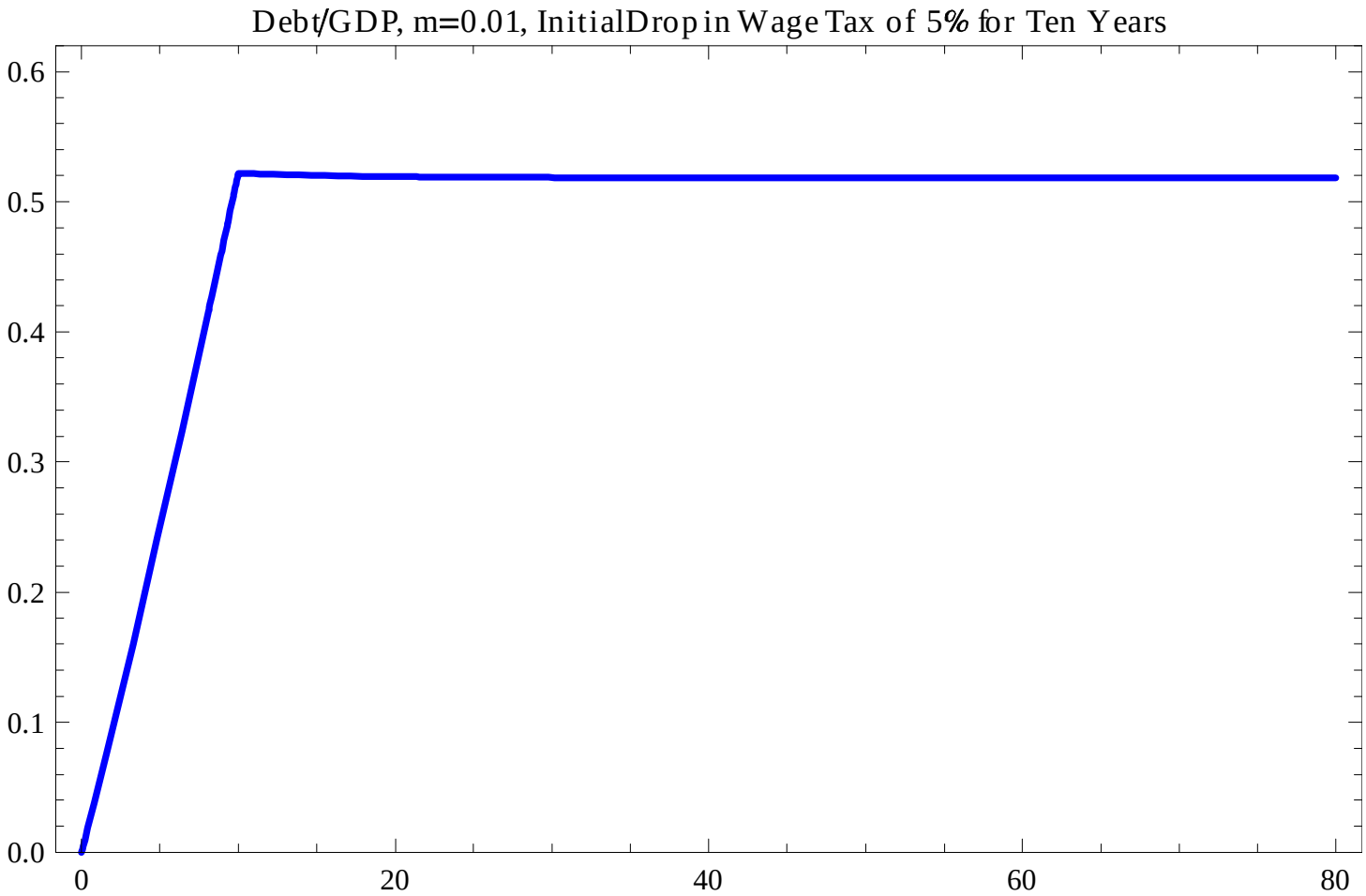
Lower Wage Taxes Five Percent for Ten Years with Immigration at 10 per 1000



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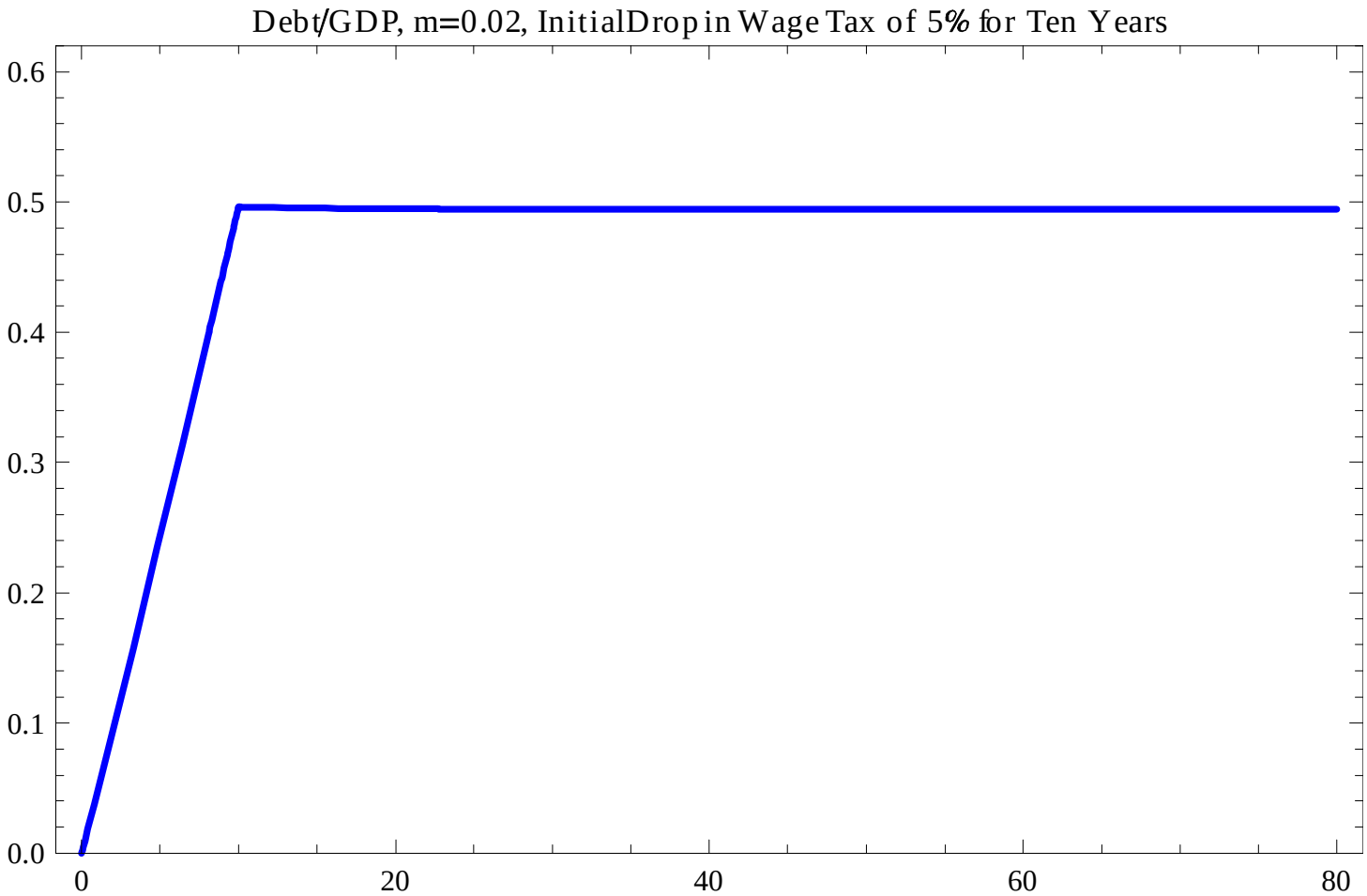
Lower Wage Taxes Five Percent for Ten Years with Immigration at 20 per 1000



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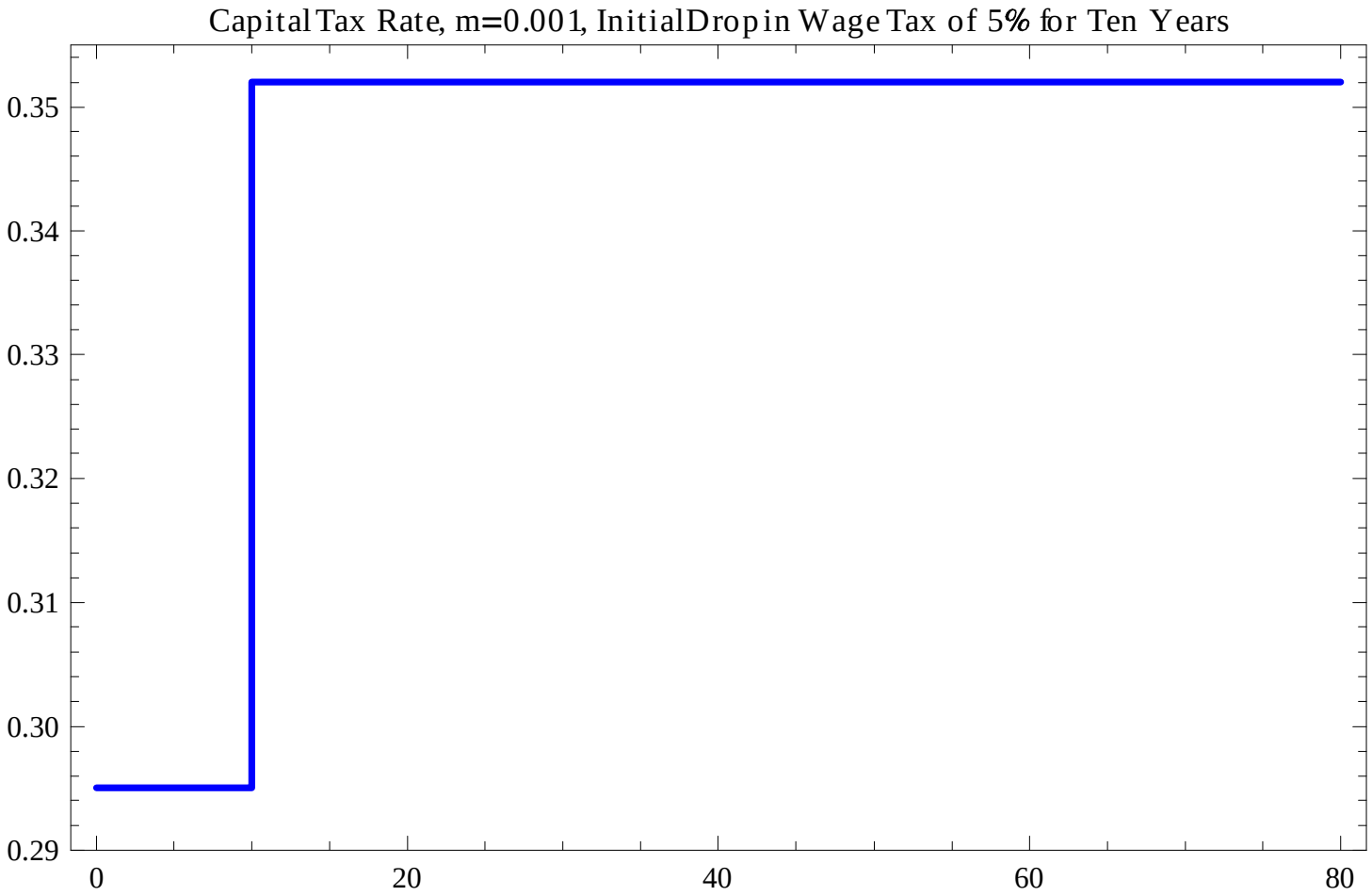

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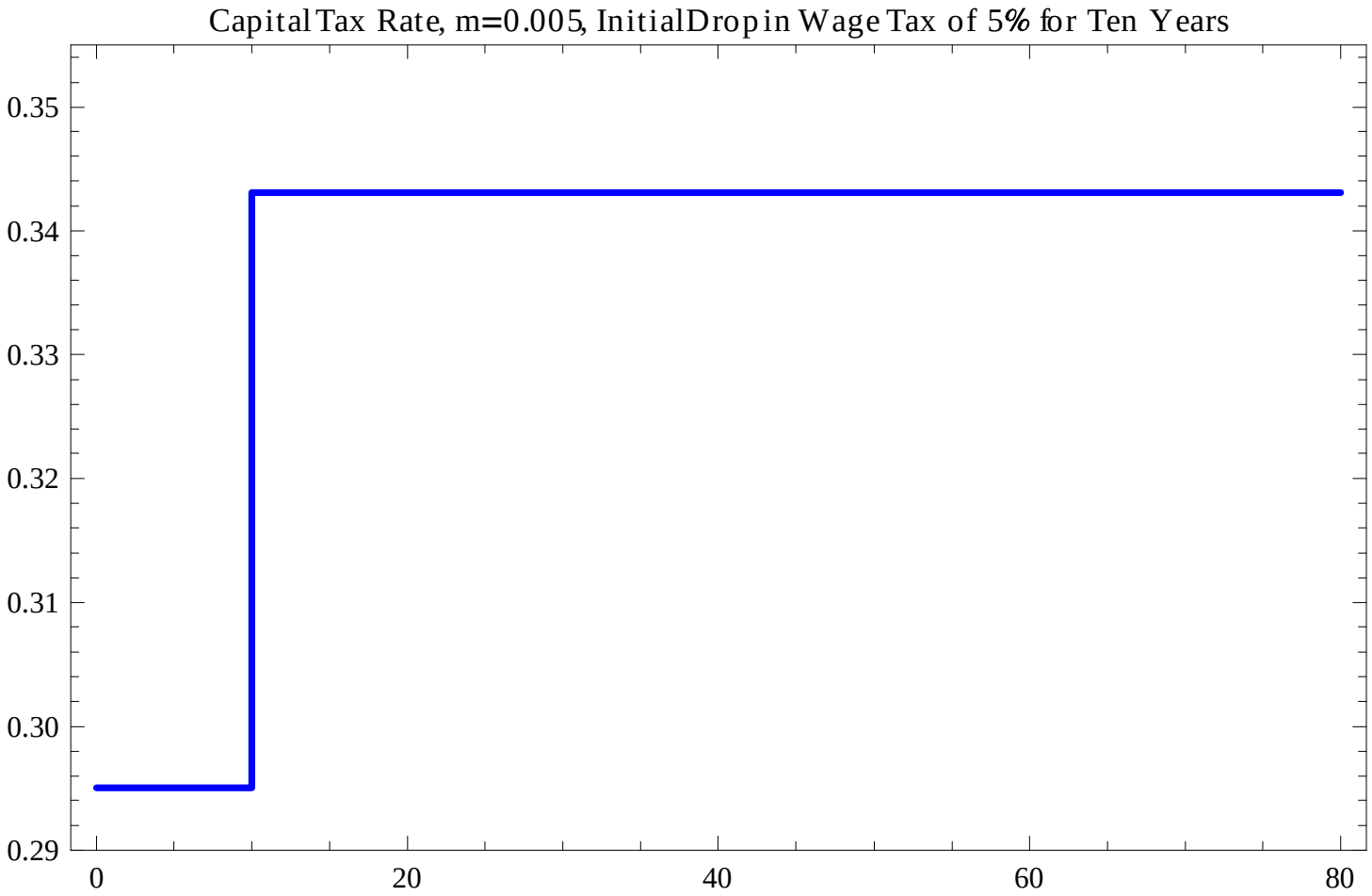

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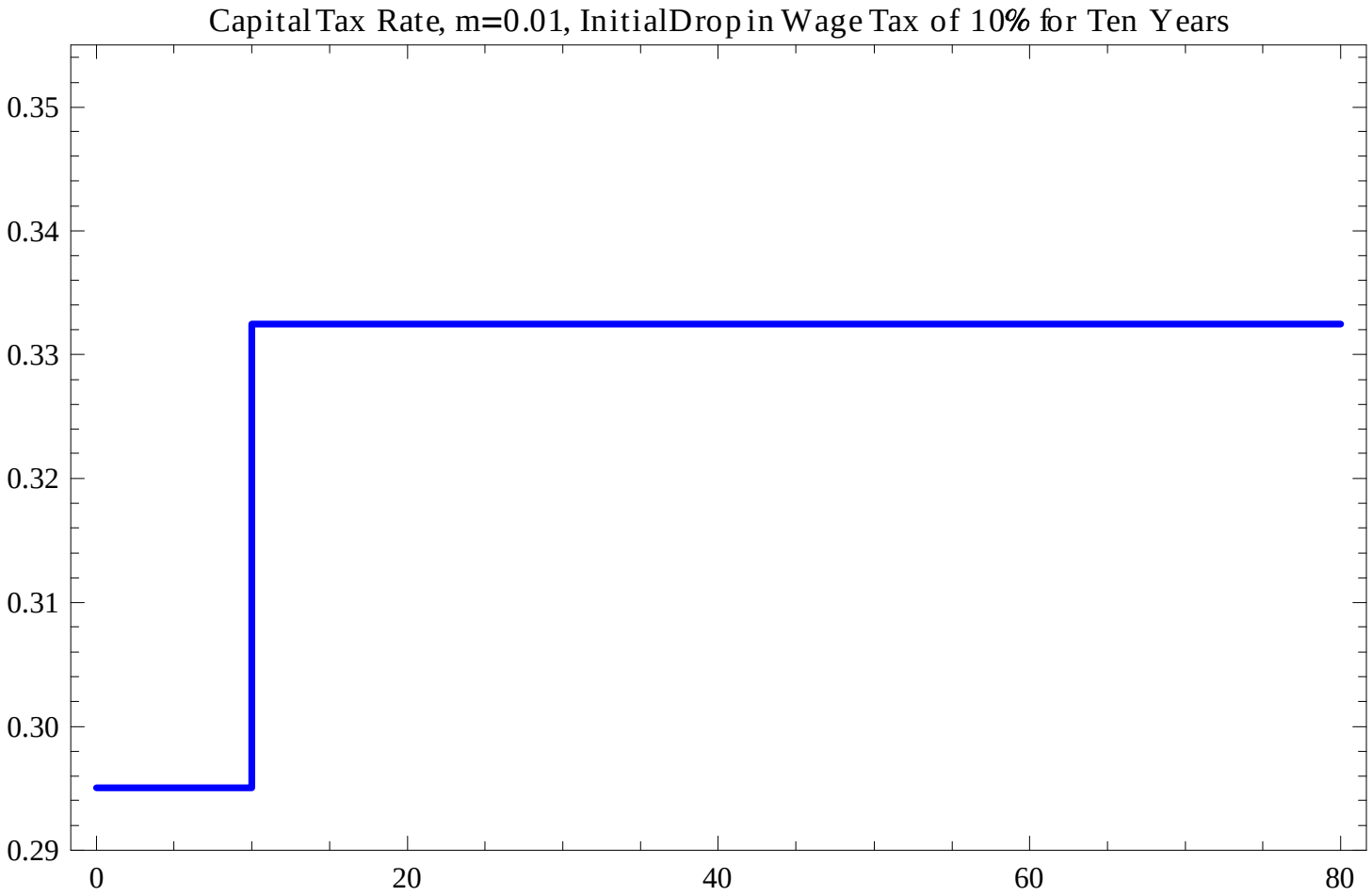

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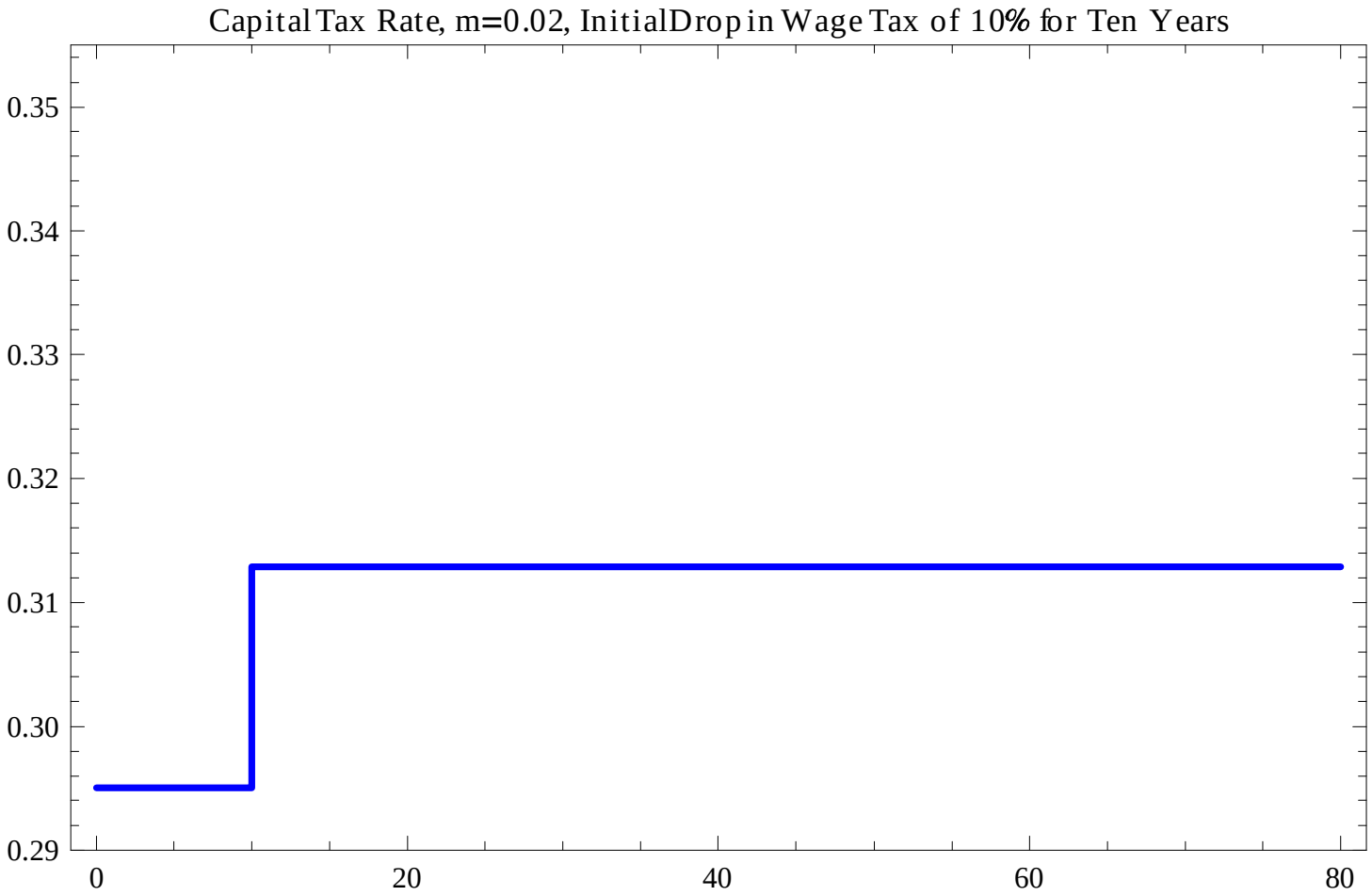

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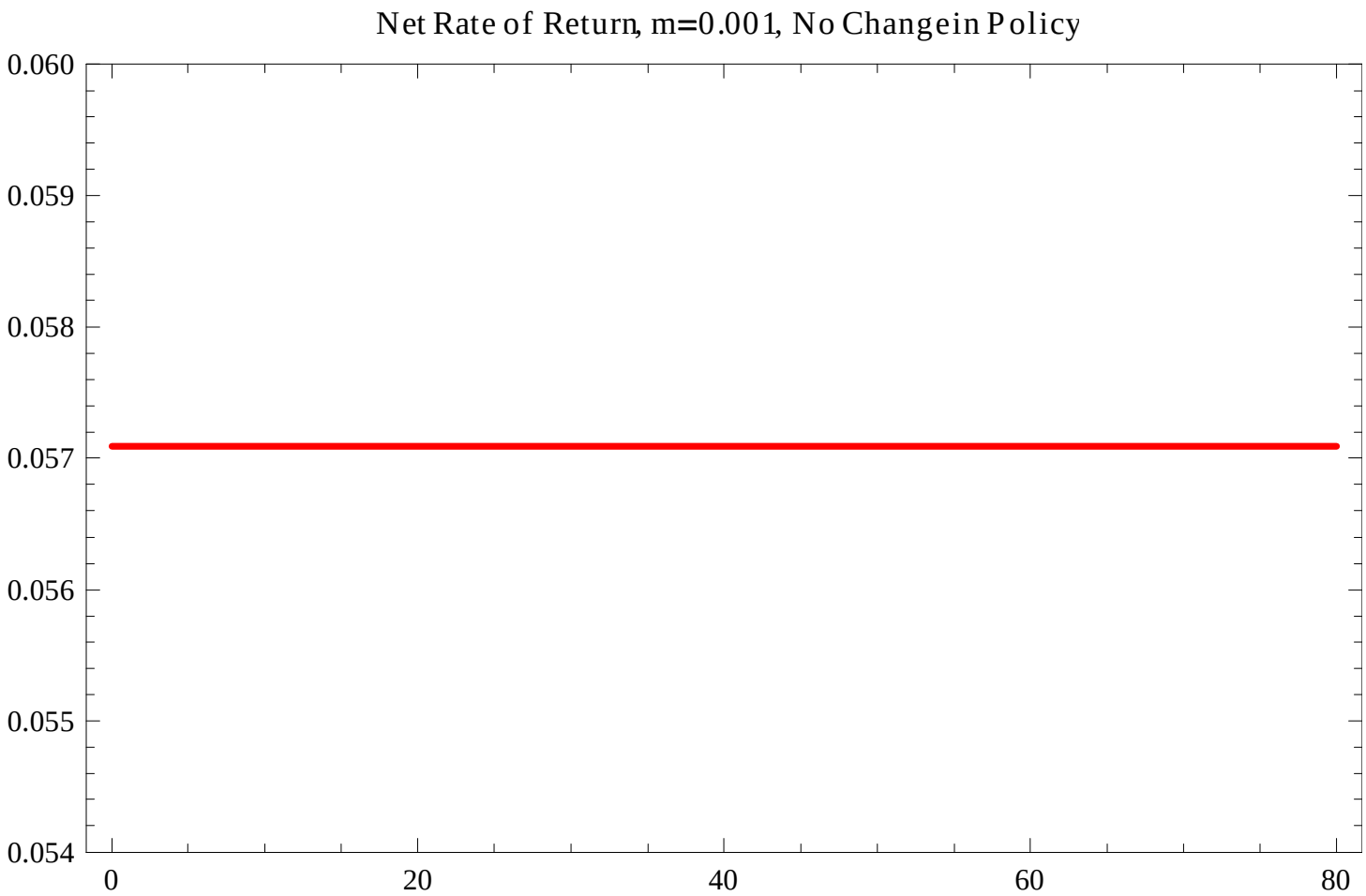
Lower Wage Taxes Five Percent for Ten Years with Immigration at 1 per 1000



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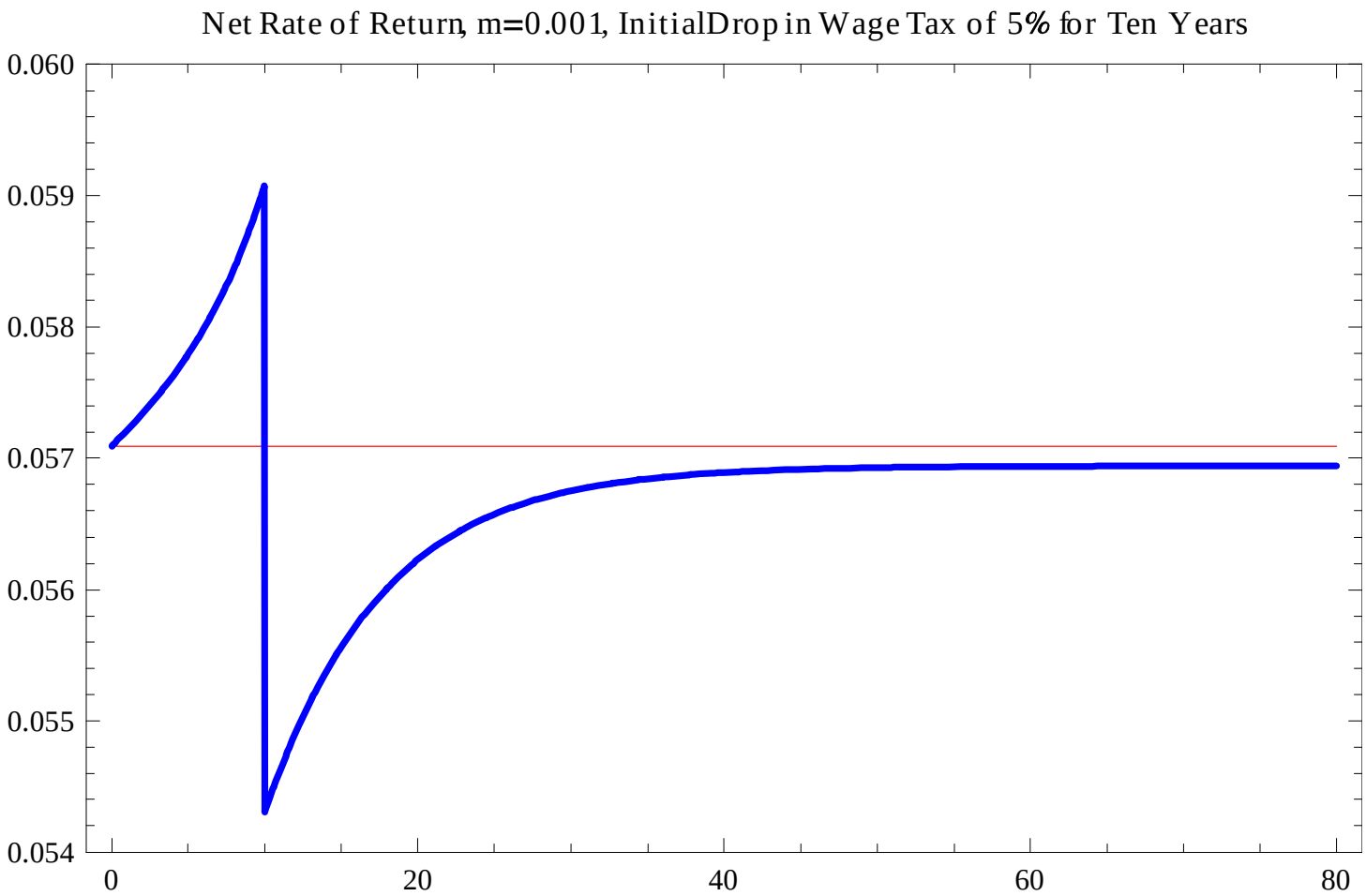

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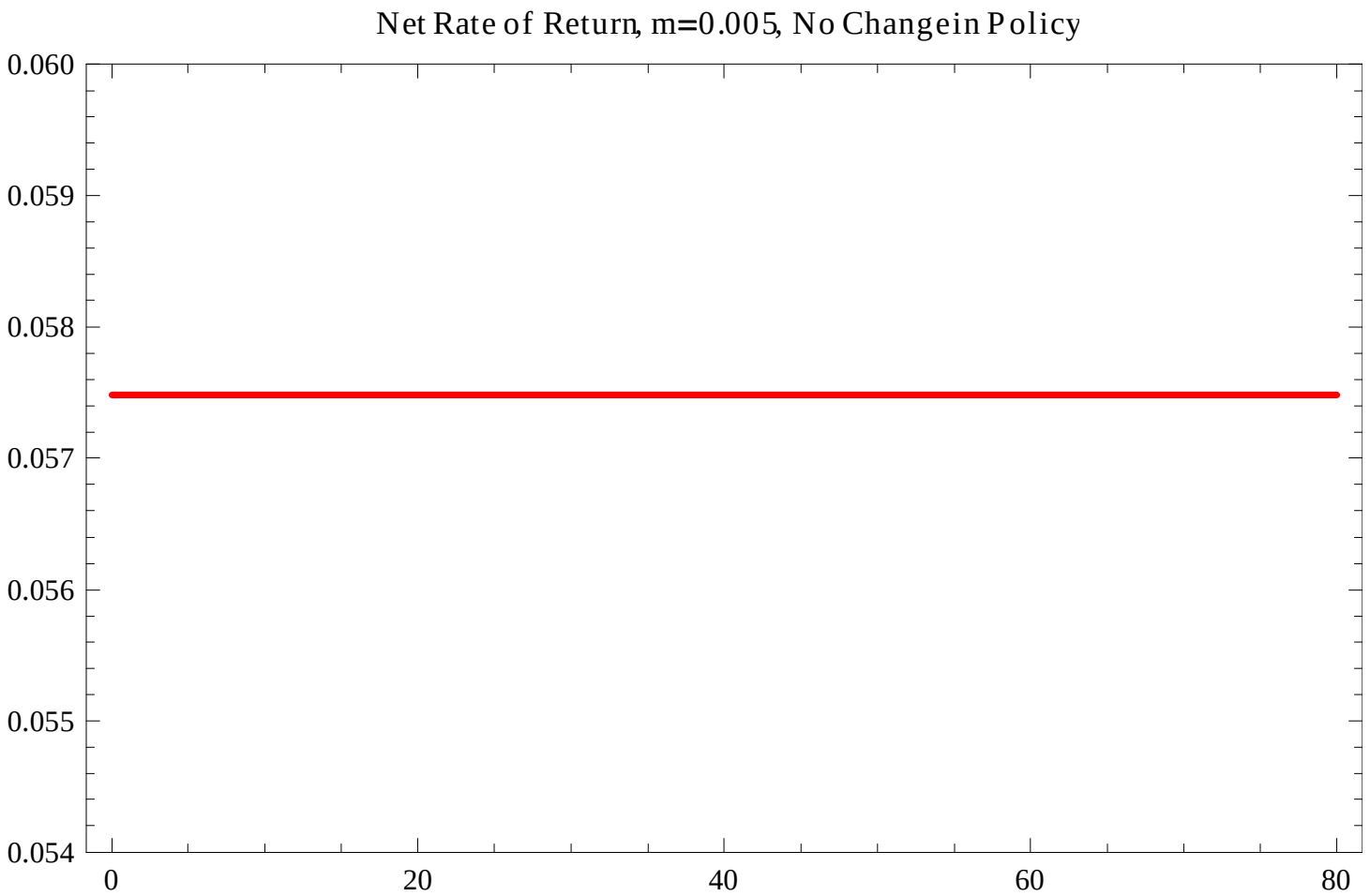
Lower Wage Taxes Five Percent for Ten Years with Immigration at 5 per 1000



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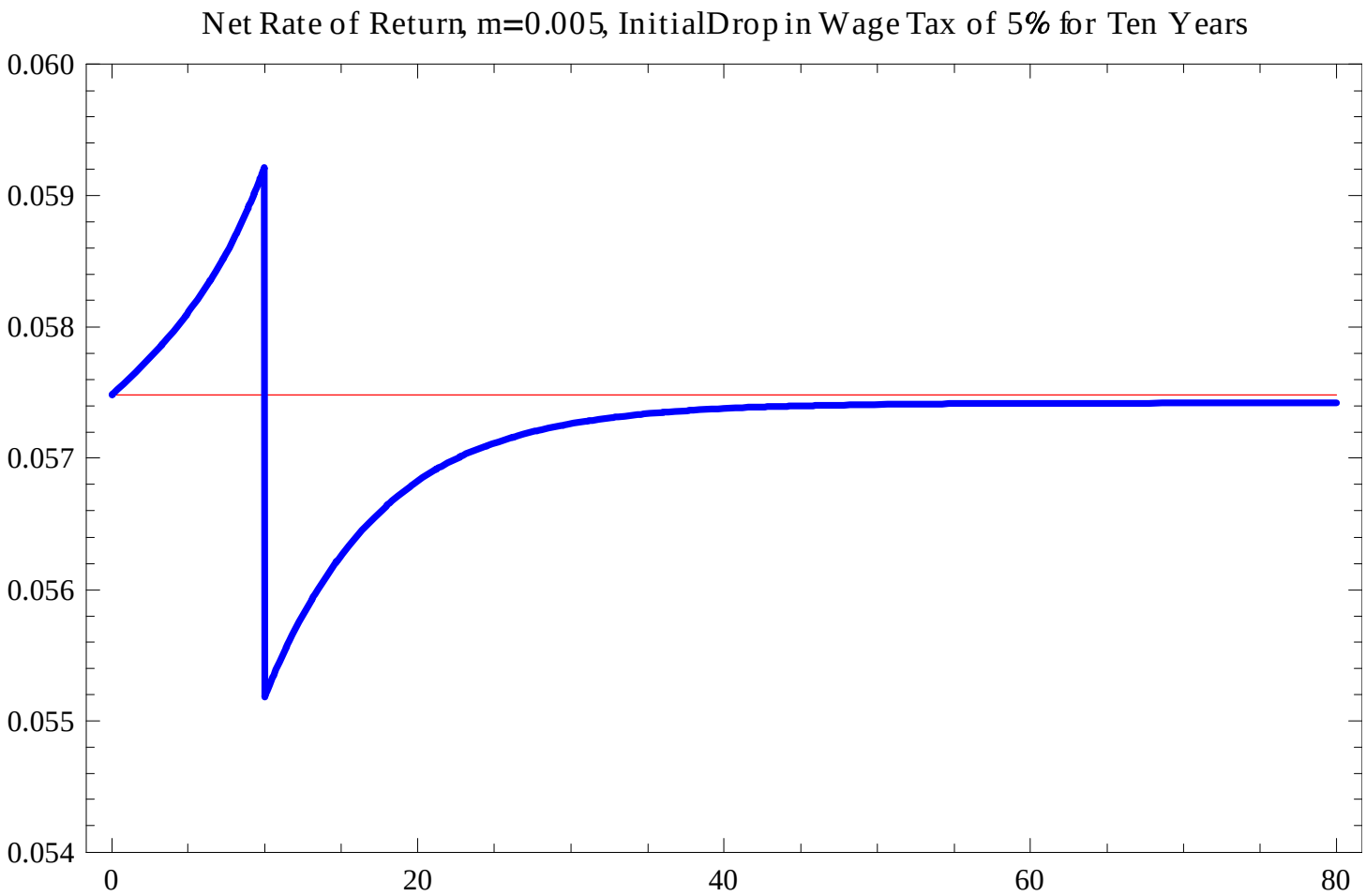

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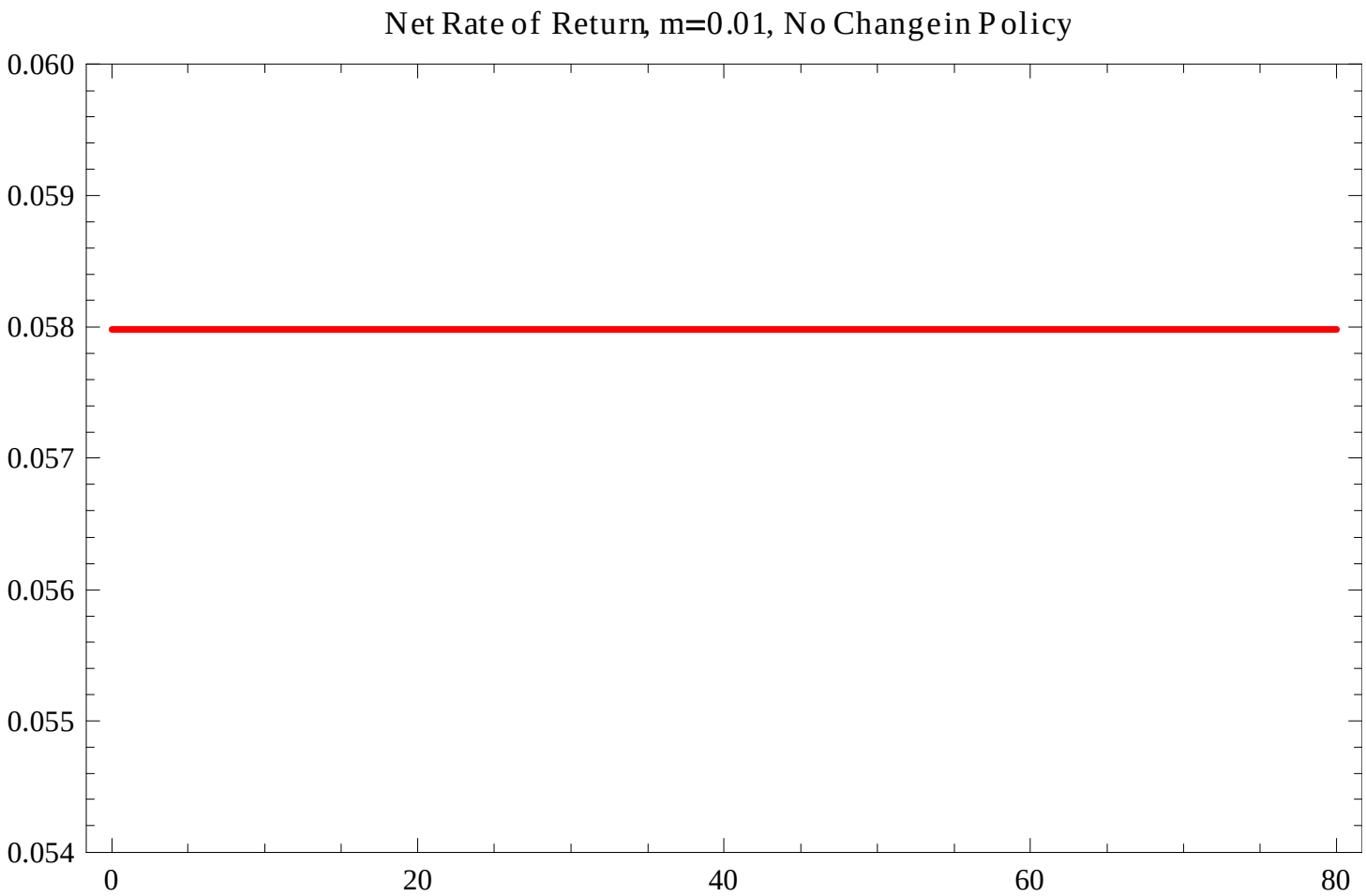
Lower Wage Taxes Five Percent for Ten Years with Immigration at 10 per 1000



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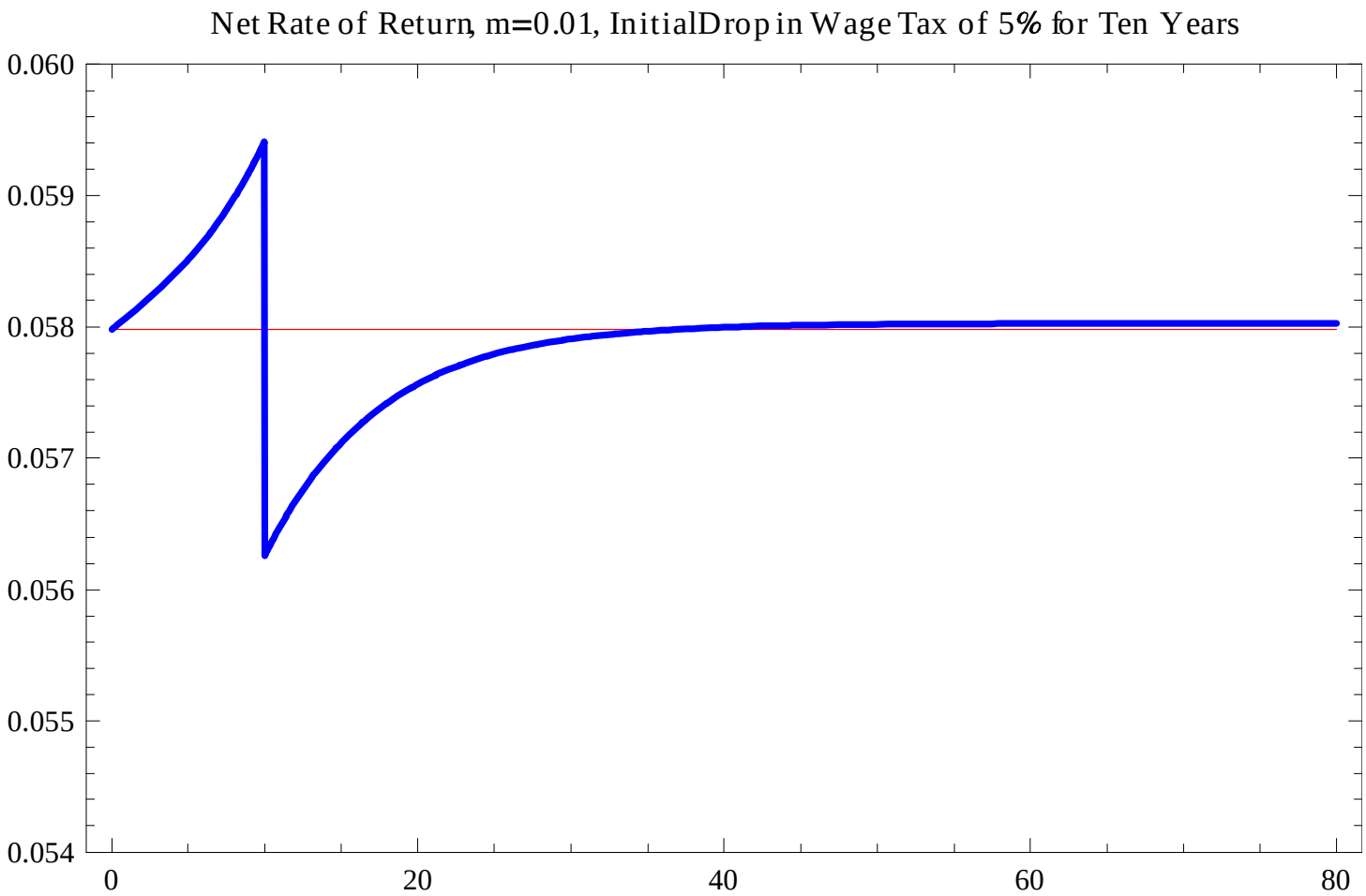

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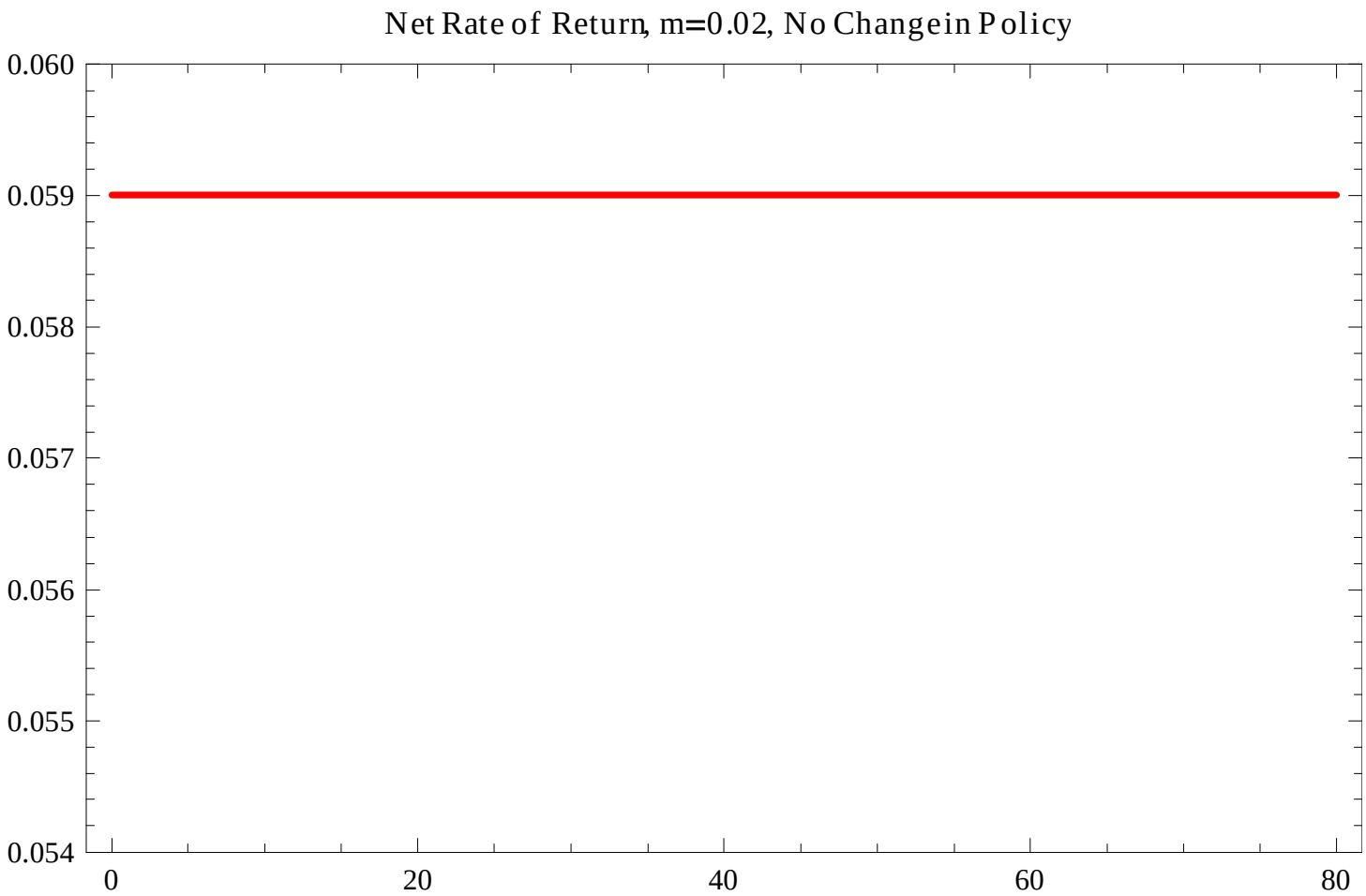
Lower Wage Taxes Five Percent for Ten Years with Immigration at 20 per 1000



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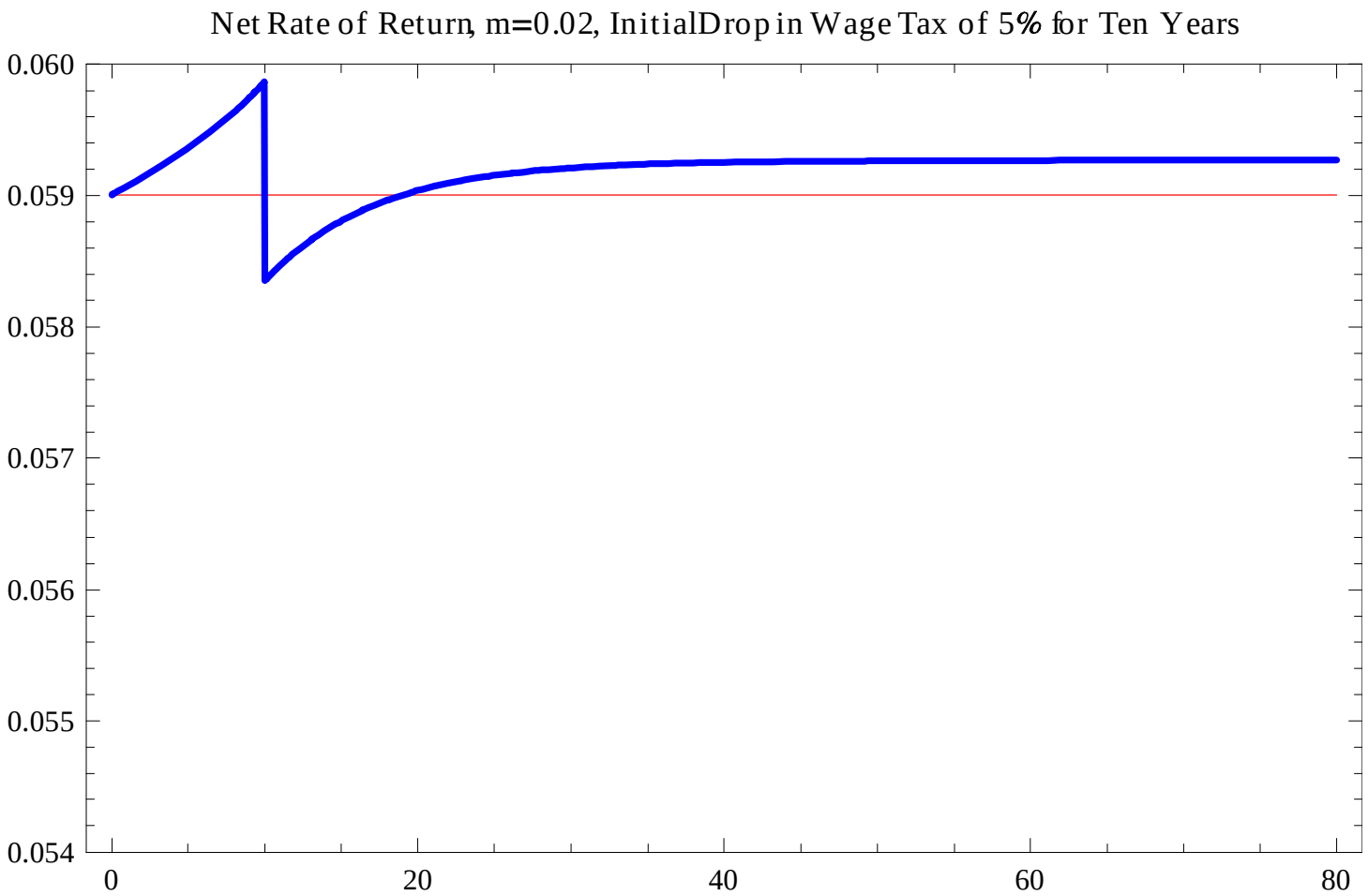

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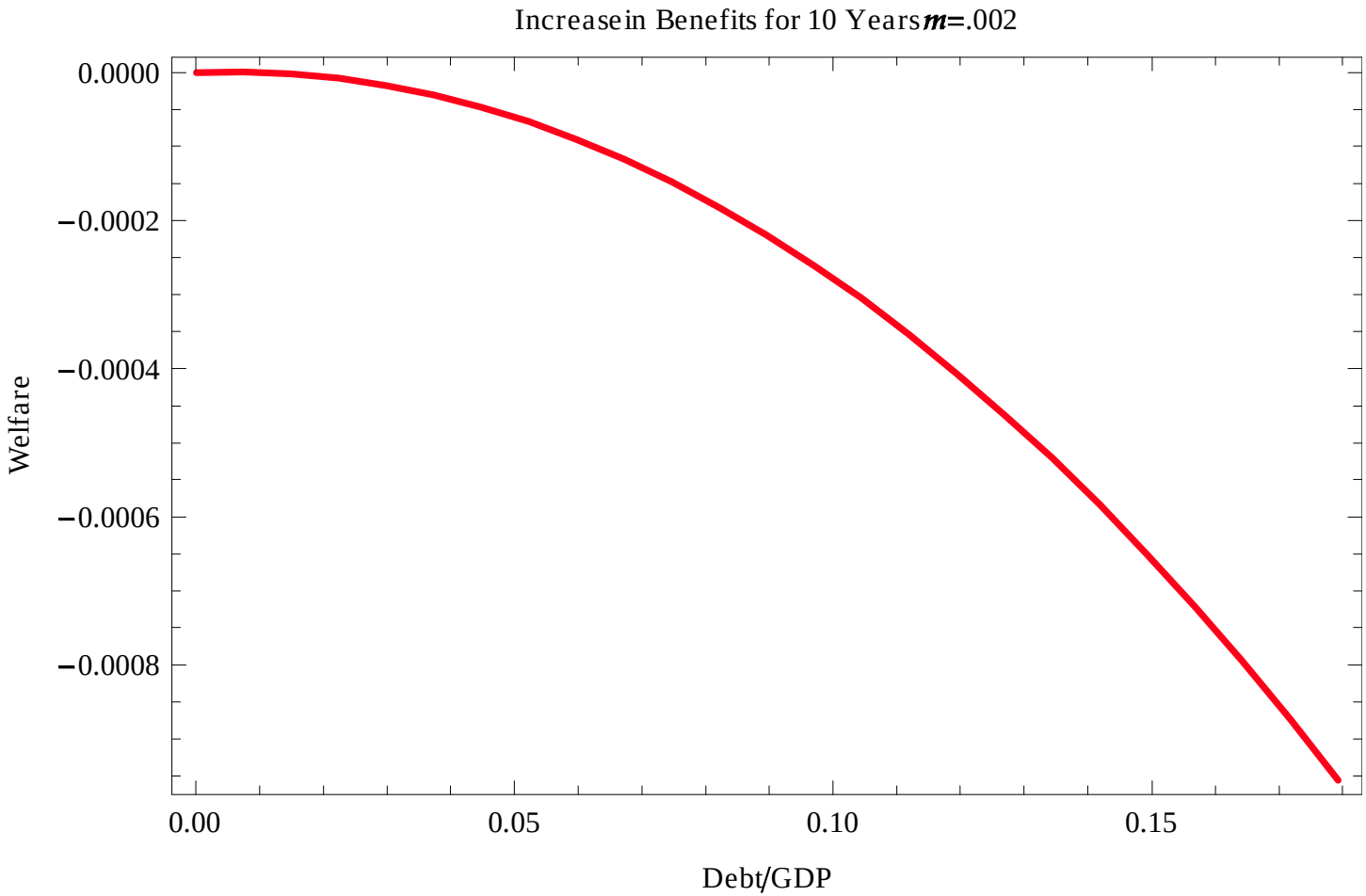
Welfare Effects of Lowering Wage Taxes for Ten Years with Immigration at 2 per 1000



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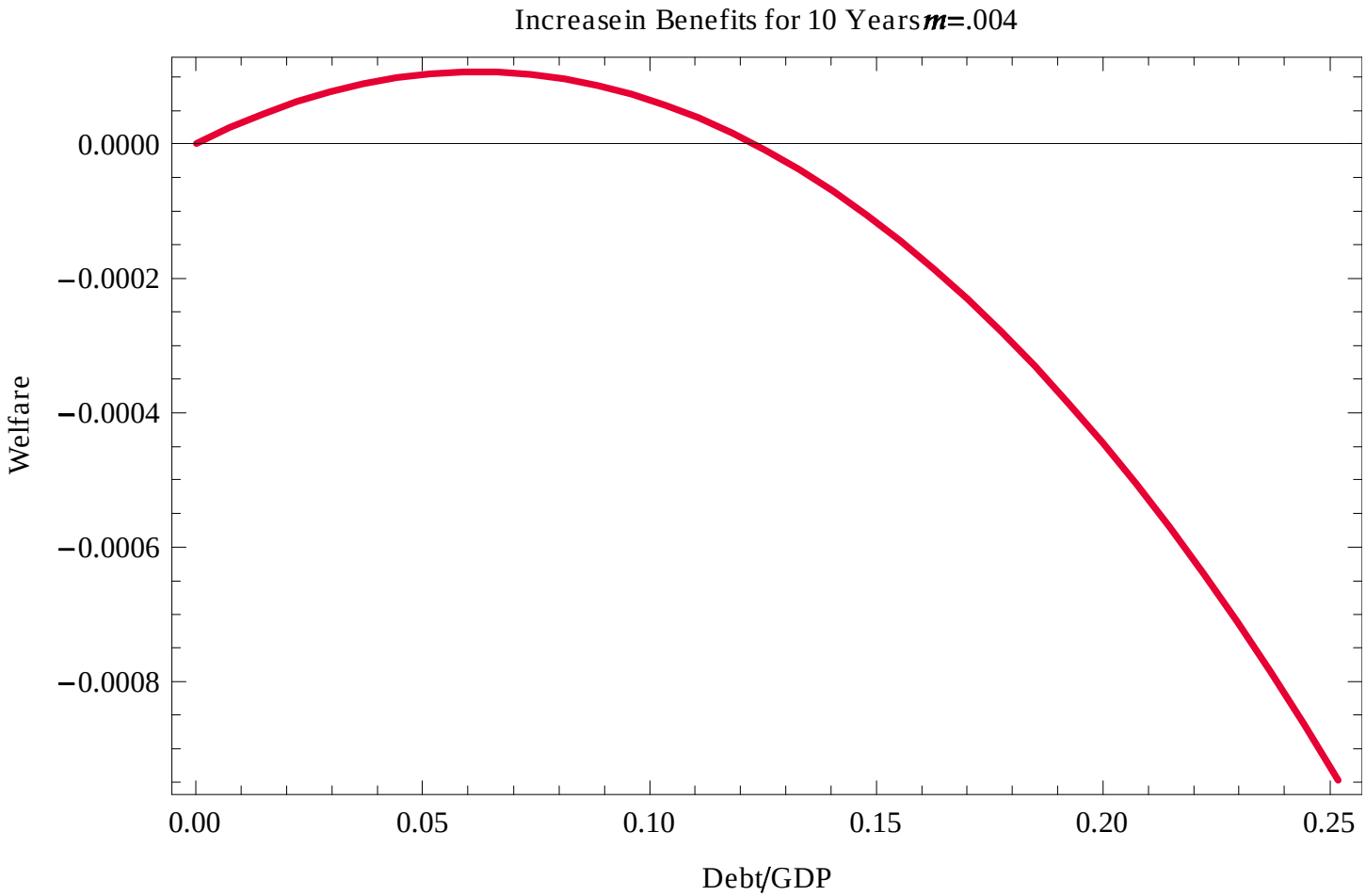
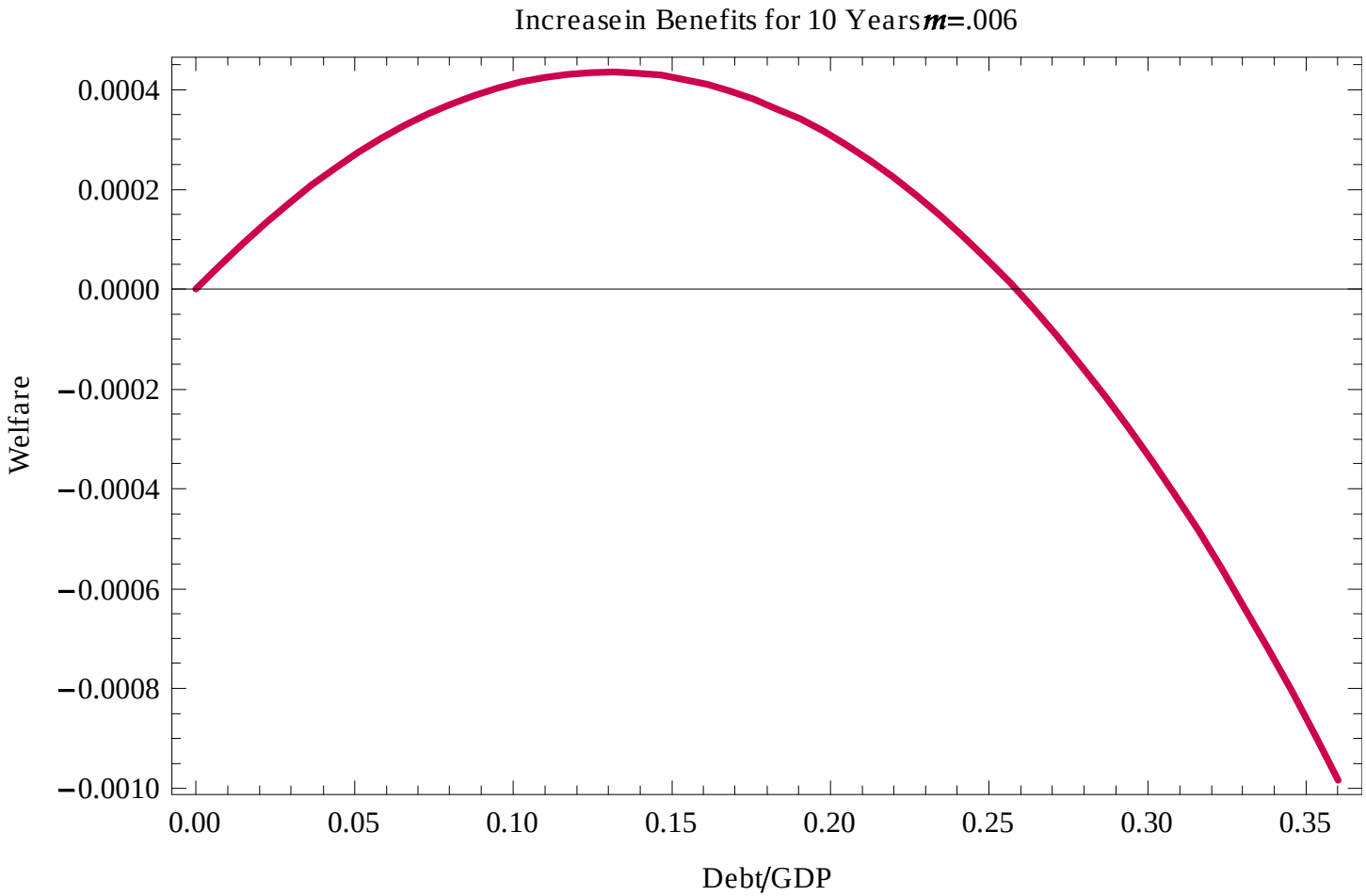
Welfare Effects of Lowering Wage Taxes for Ten Years with Immigration at 4 per 1000



CITY UNIVERSITY LONDON

Welfare Effects of Lowering Wage Taxes for Ten Years with Immigration at 6 per 1000



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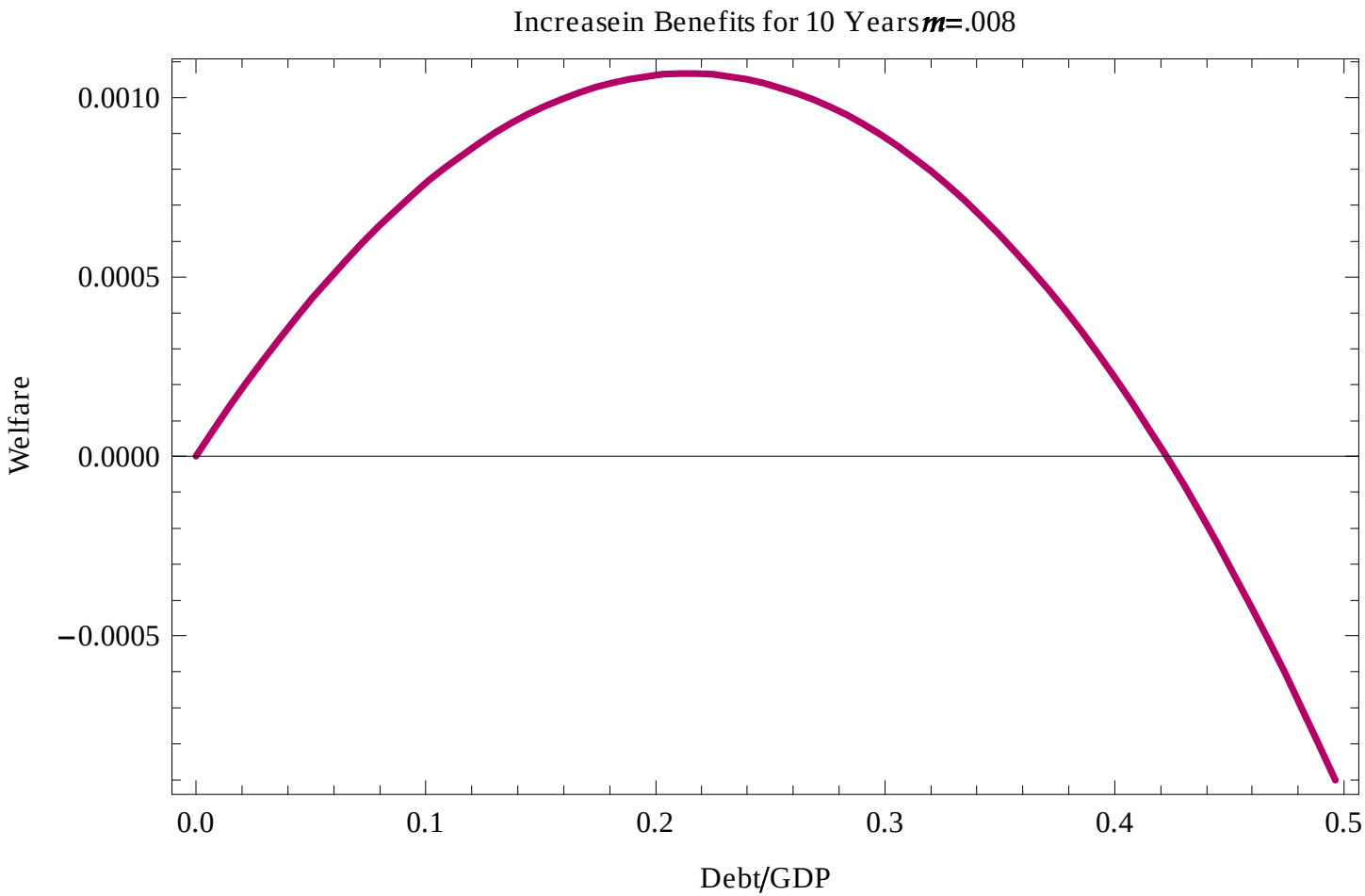
Welfare Effects of Lowering Wage Taxes for Ten Years with Immigration at 8 per 1000



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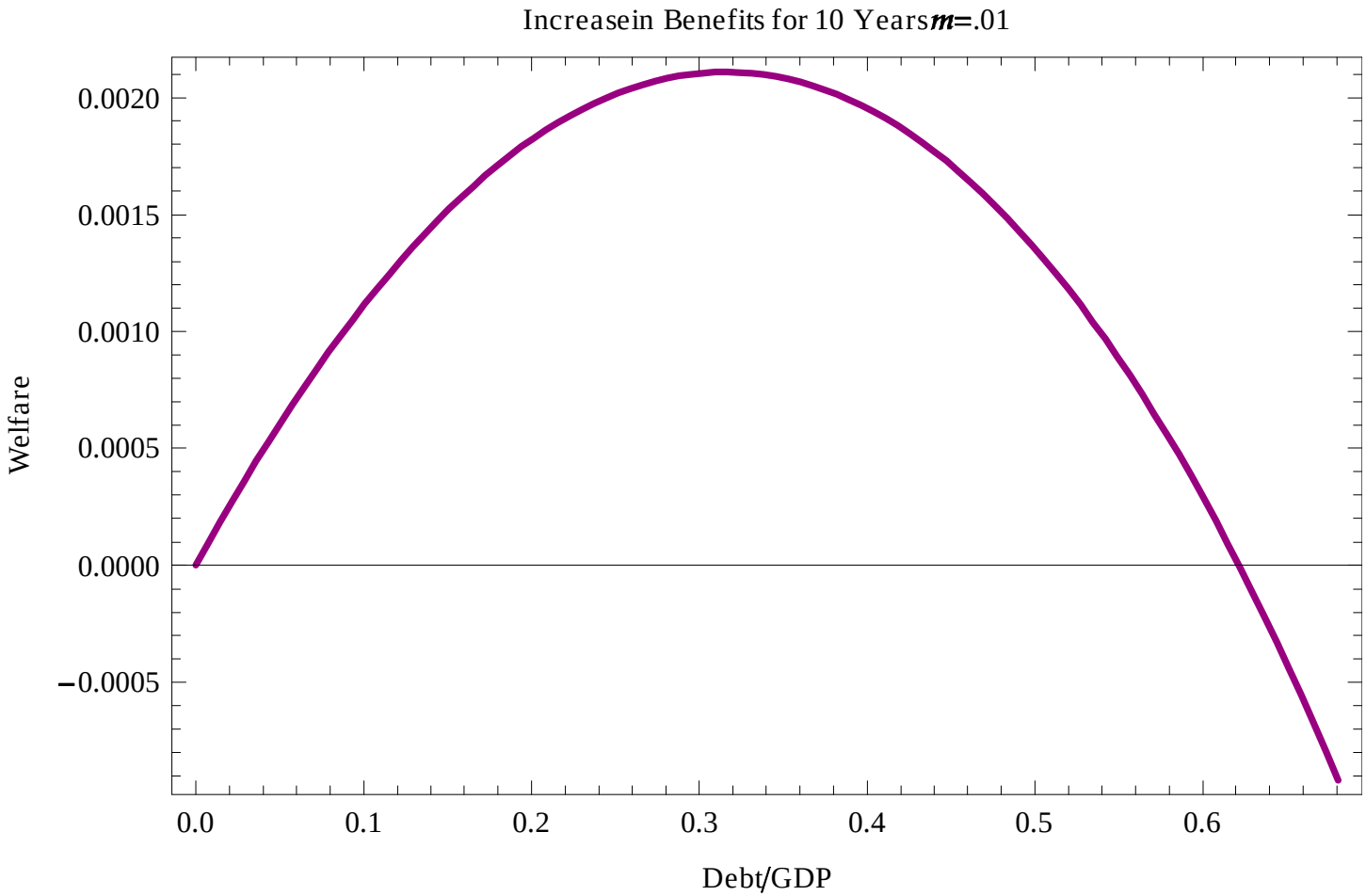
Welfare Effects of Lowering Wage Taxes for Ten Years with Immigration at 10 per 1000



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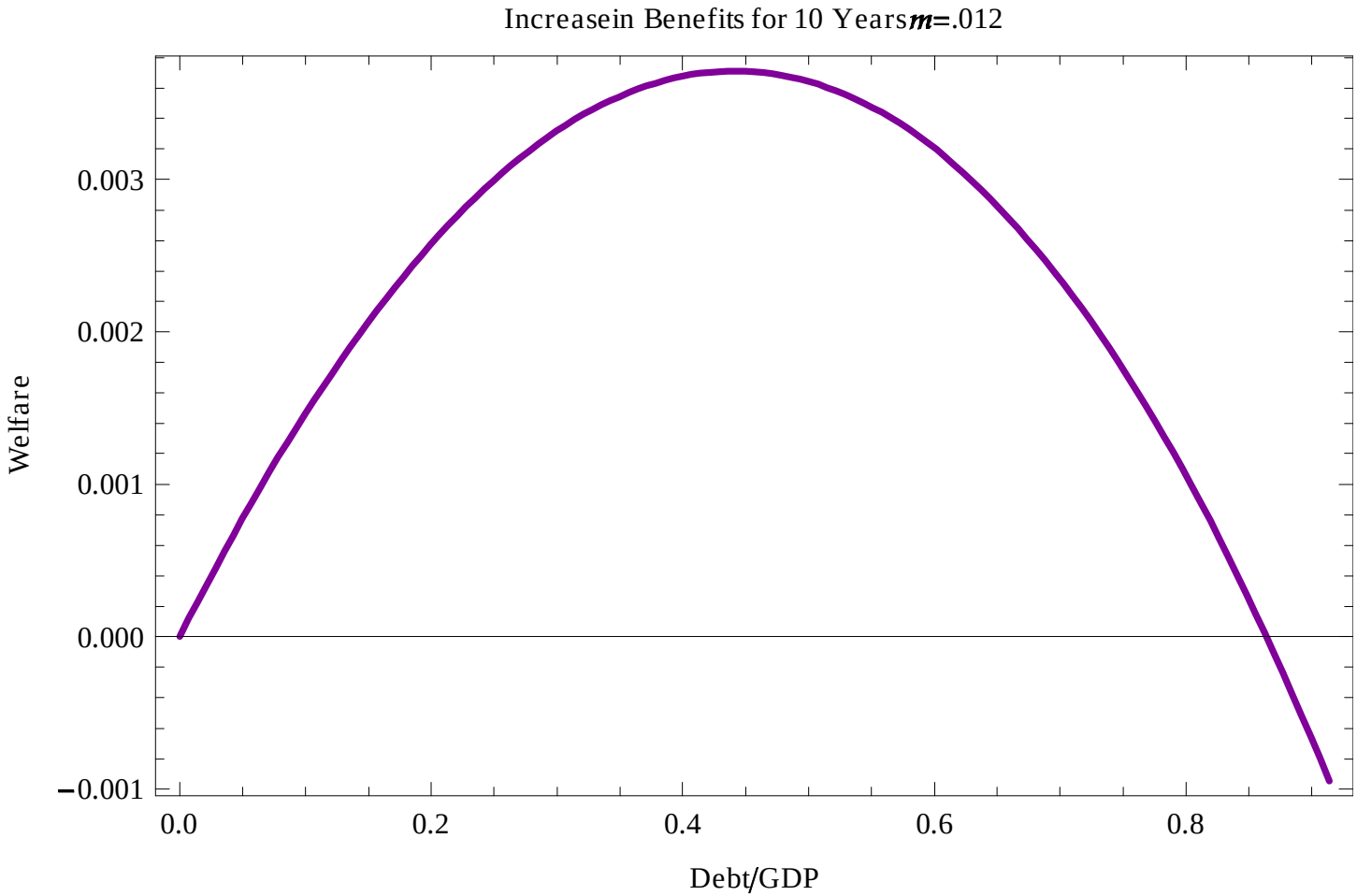
Welfare Effects of Lowering Wage Taxes for Ten Years with Immigration at 12 per 1000



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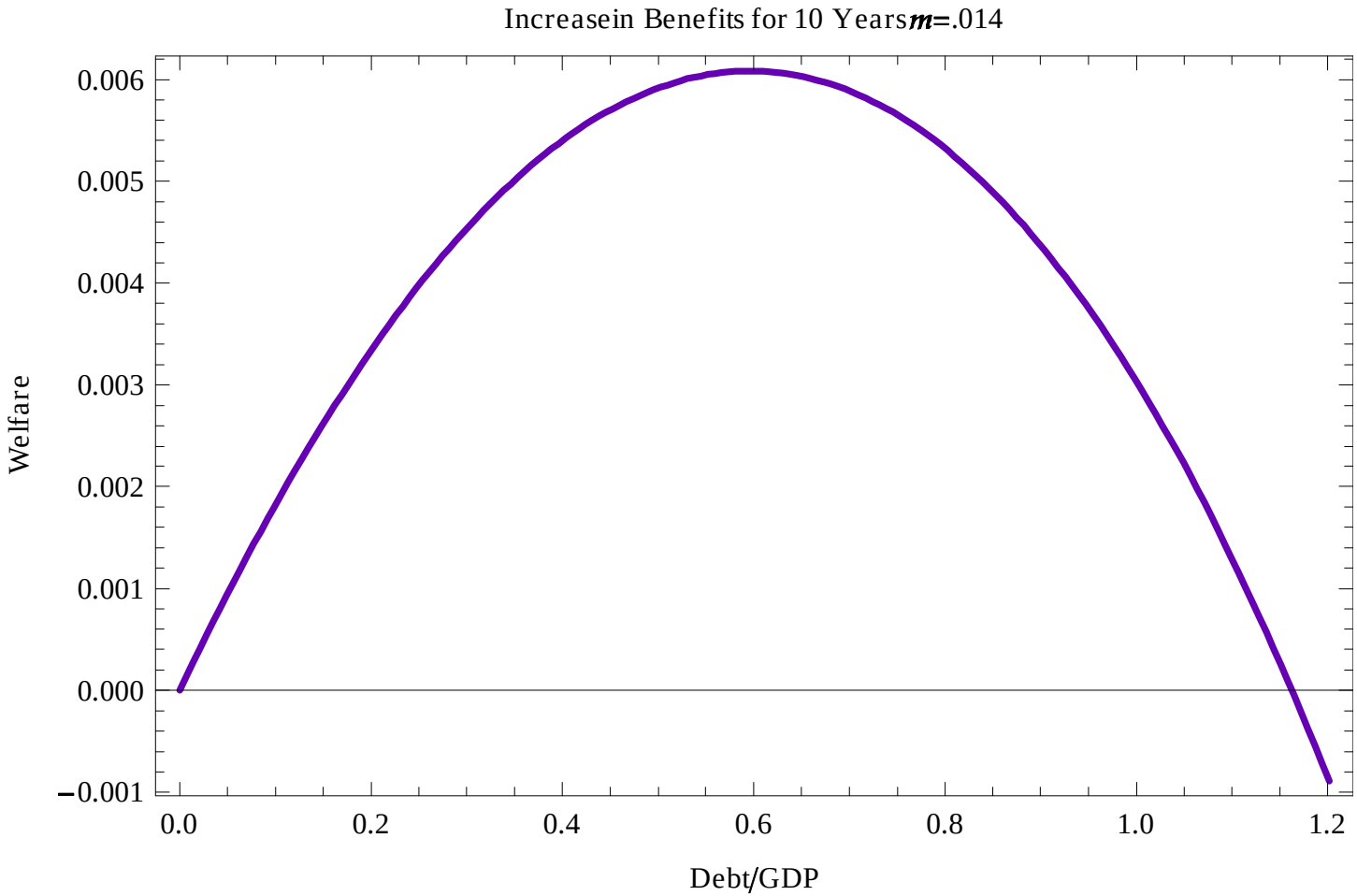
Welfare Effects of Lowering Wage Taxes for Ten Years with Immigration at 14 per 1000



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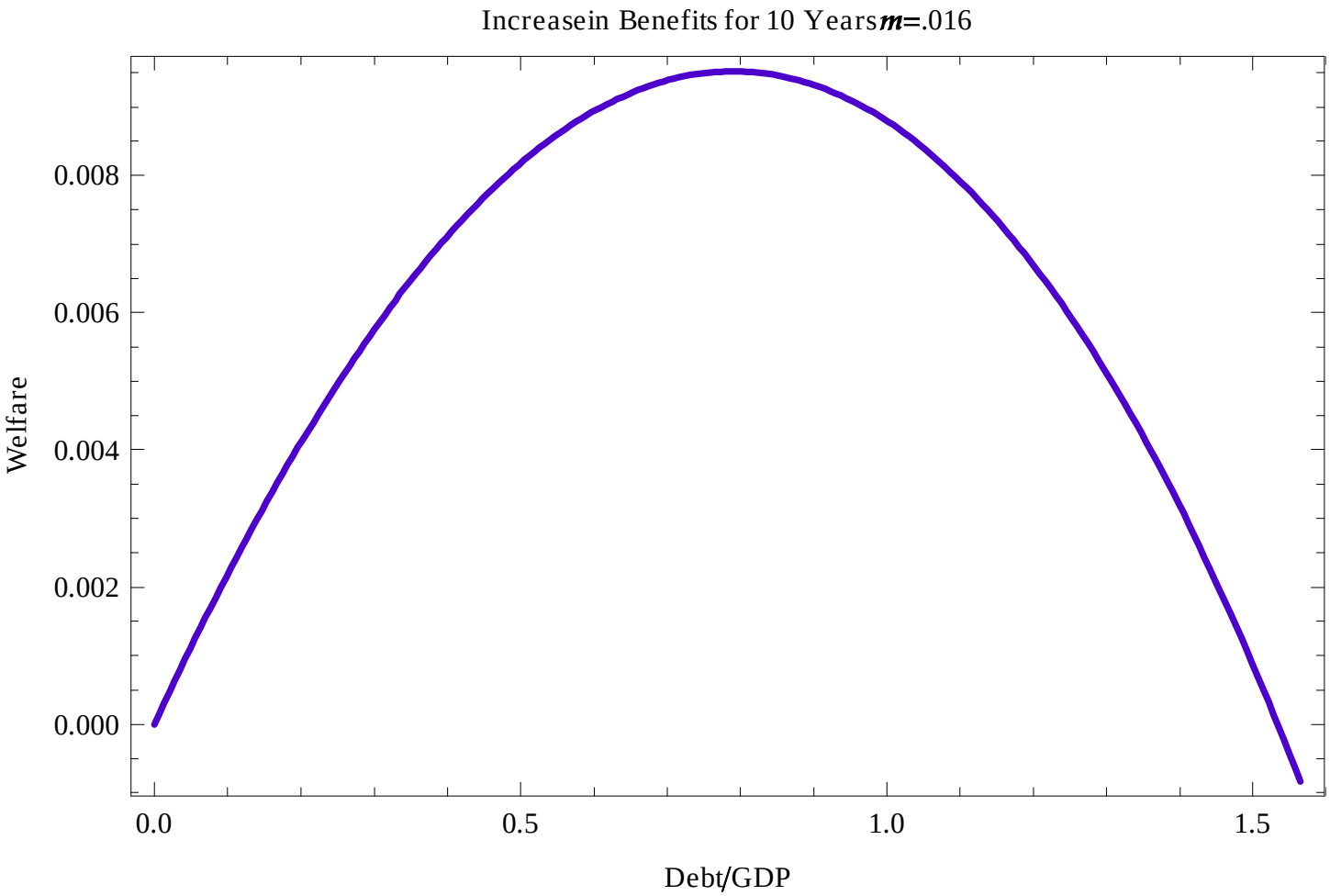
Welfare Effects of Lowering Wage Taxes for Ten Years with Immigration at 16 per 1000



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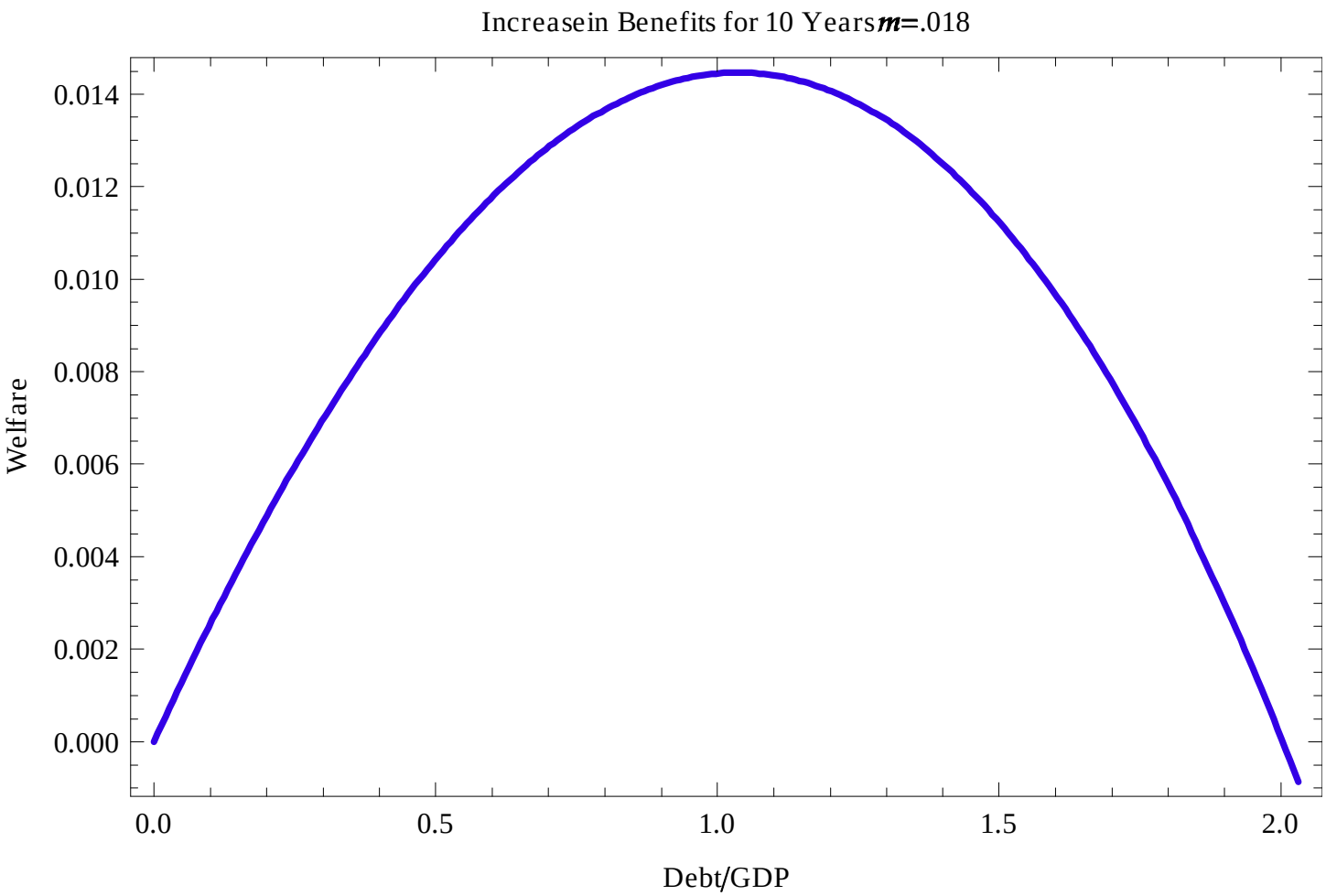
Welfare Effects of Lowering Wage Taxes for Ten Years with Immigration at 18 per 1000



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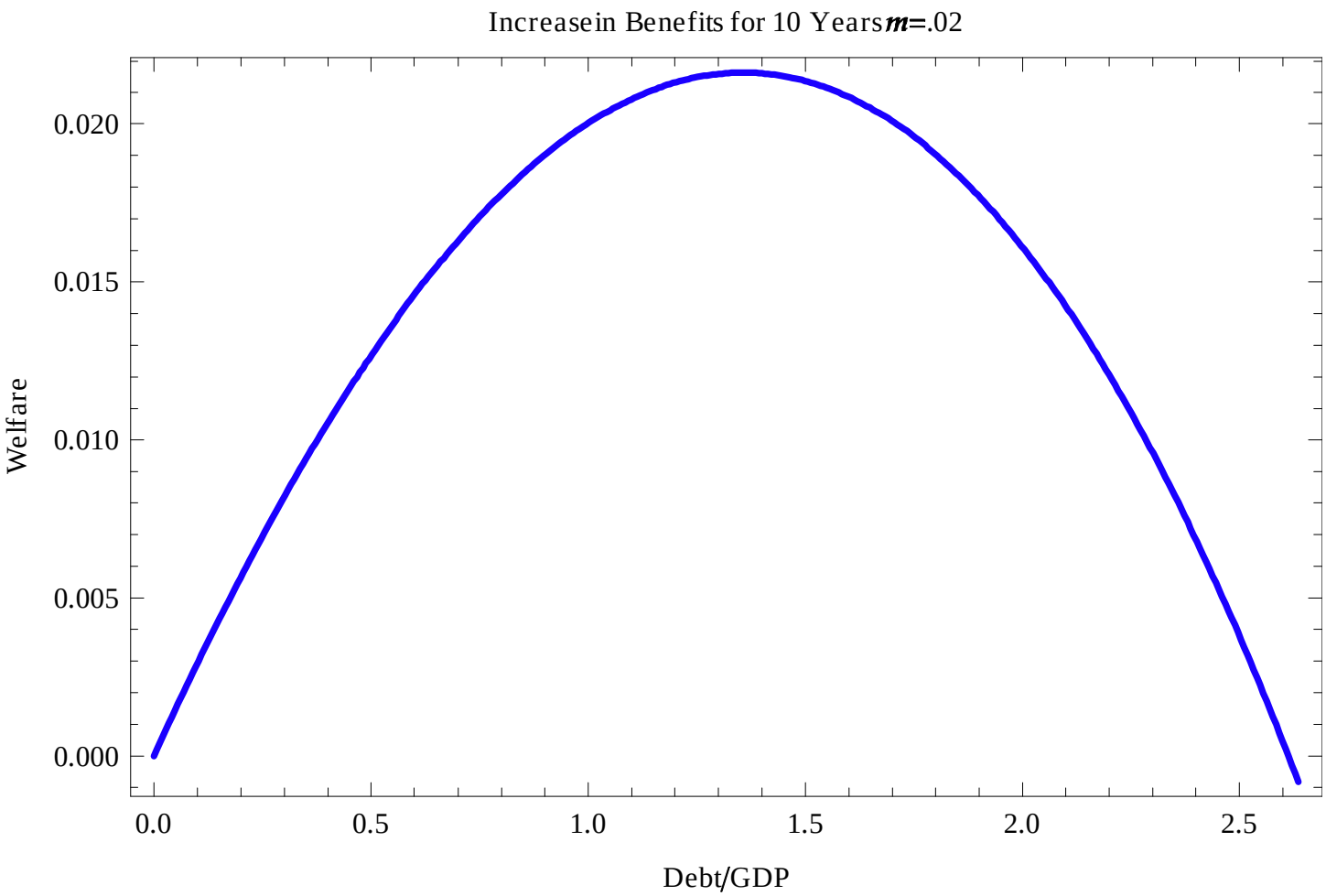
Welfare Effects of Lowering Wage Taxes for Ten Years with Immigration at 20 per 1000



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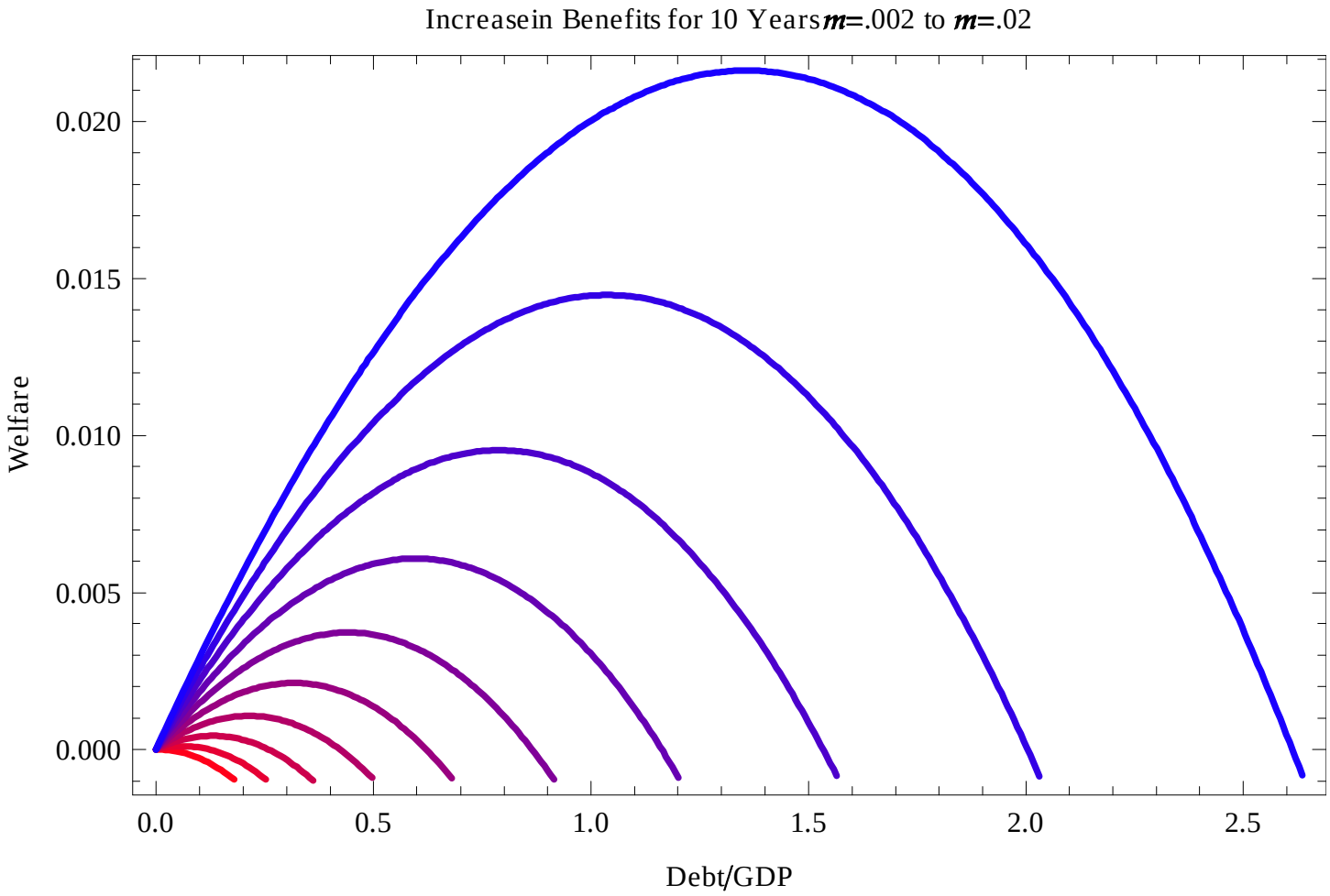

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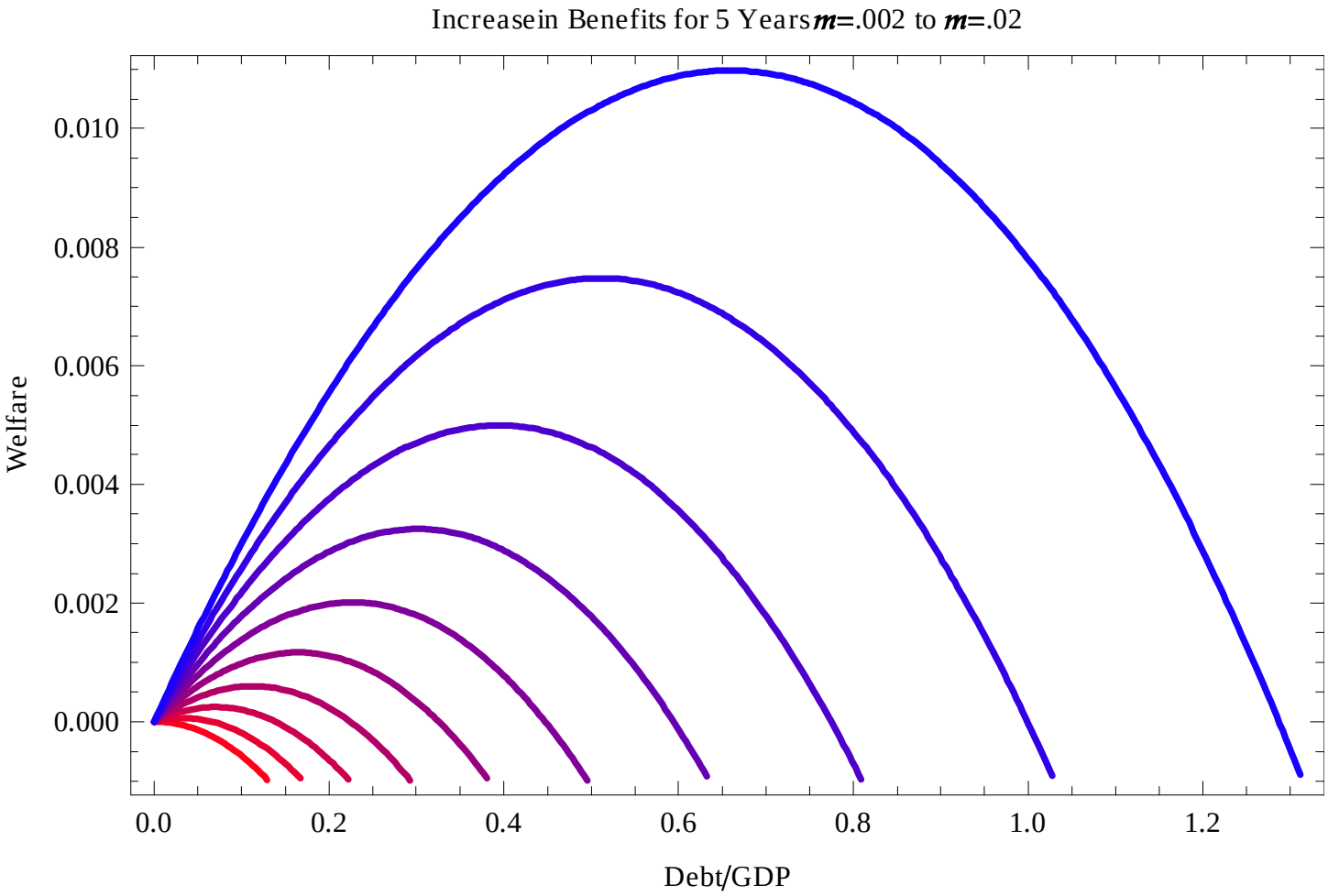
Welfare Effects of Lowering Wage Taxes for Five Years



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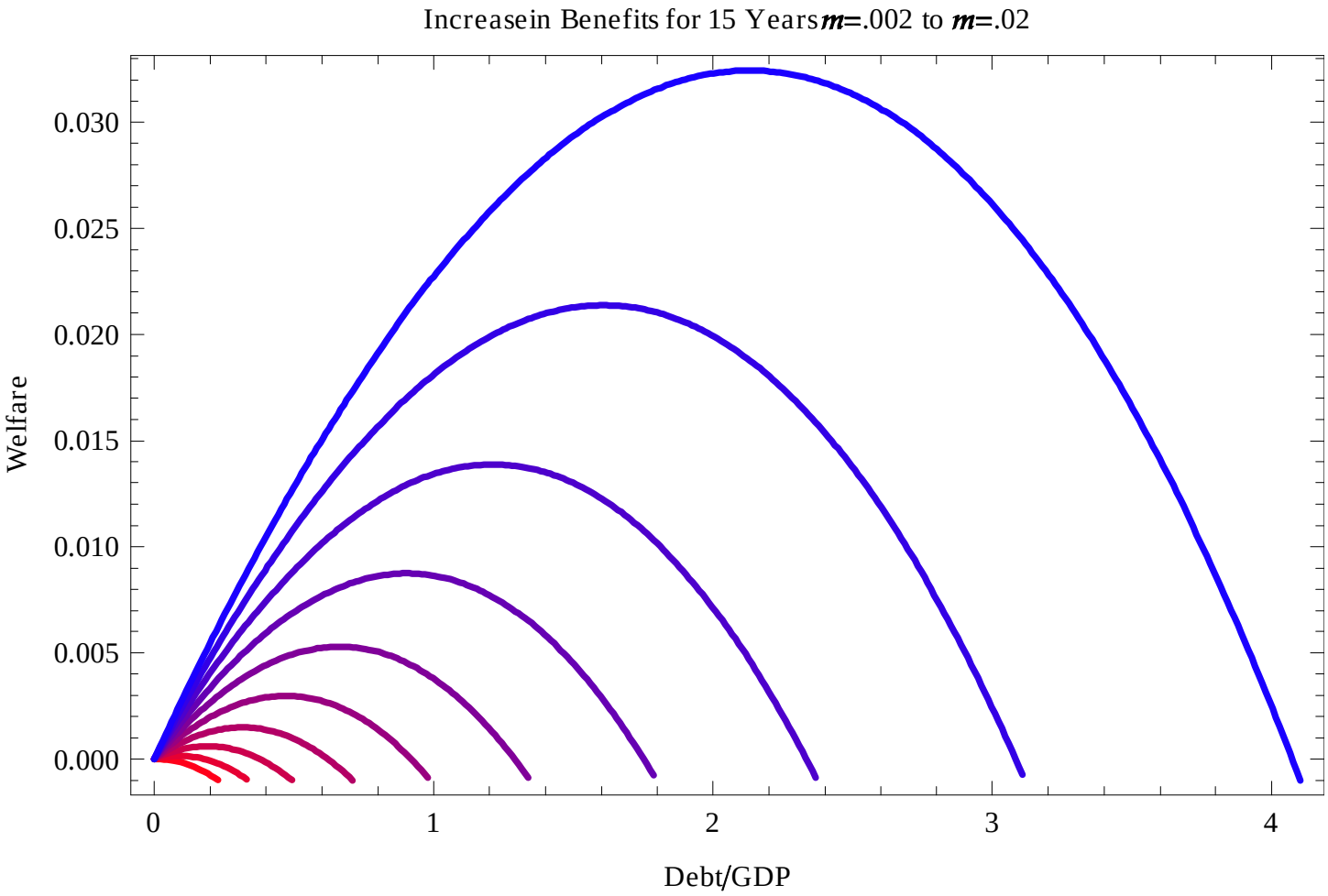
Welfare Effects of Lowering Wage Taxes for Fifteen Years



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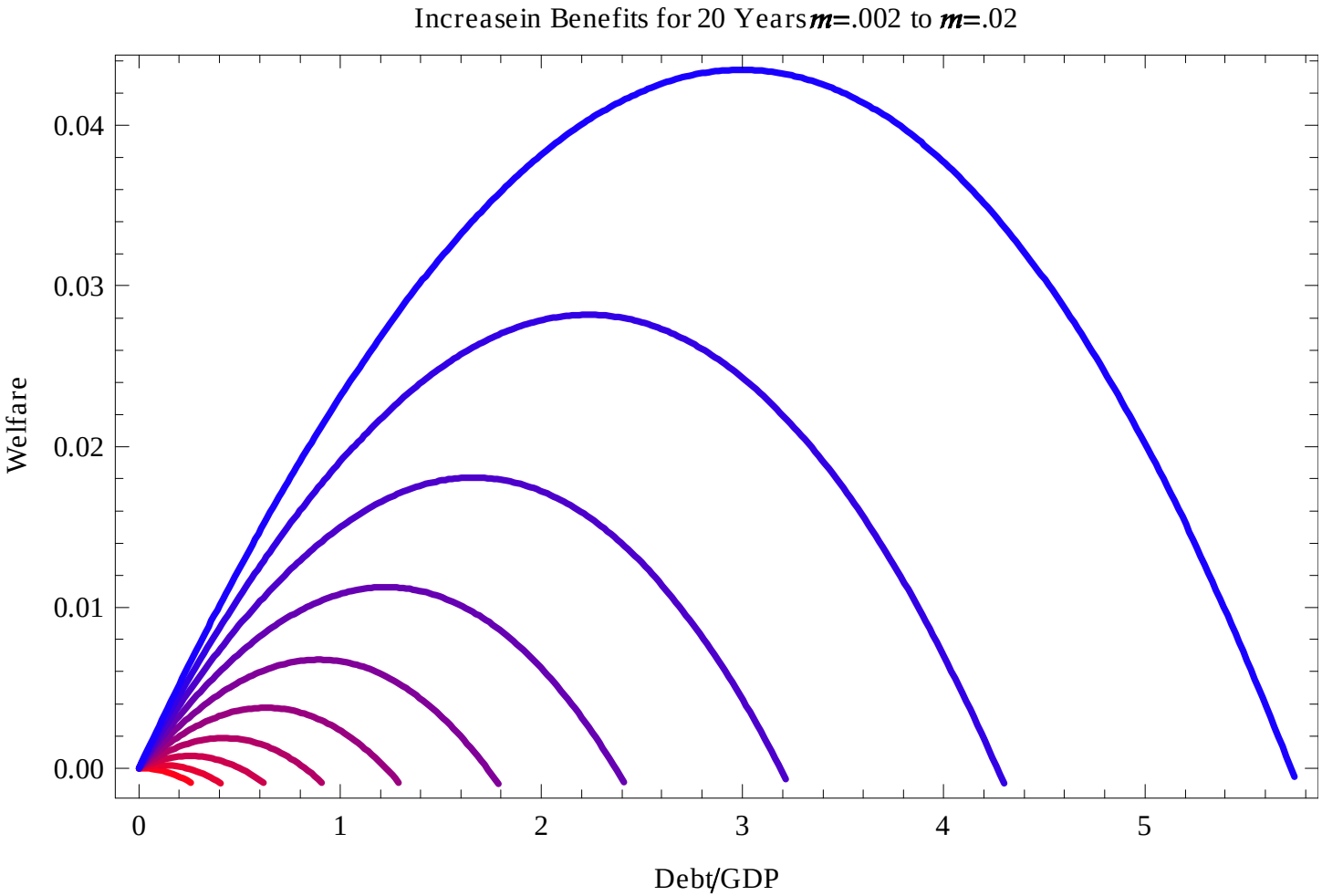
Welfare Effects of Lowering Wage Taxes for Twenty Years



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Results So Far

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- Much scope for shifting taxes across time.

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- Consider elastic labour supply.

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- Expanding Unfunded Liabilities to Finance: US Prescription Drugs for the Elderly—could cost $1.2 over the course of the next decade.
- Rising Public Debt throughout Europe—much of which is structural.
- Example of Greece—immigration averaged 5.6 per thousand between 1995-2000, now 2.7. Foreign born population now approximately 10%, from nearly nothing a generation ago.

Historical Examples

- U.S. Civil War Pensions

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- Argentina, 1890's, *cédulas*, Banco Hipotecario de la Provincia de Buenos Aires, Banco Hipotecario Nacional

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- Creation and subsequent growth of an unprecedented program of government redistribution to the elderly and their families. The Union Army pension program, both analogous to and a precursor of today's Social Security and Medicare, was at its zenith consuming 30% of the federal budget, with 35% of all white males between the ages of 55-59 receiving an average of $135 a year, or 53% of the annual wage of farm laborers (Costa [1992]).

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- To prove the counterfactual—that in the absence of mass immigration the program would not have existed at all—is clearly impossible and indeed unlikely.
- Nonetheless, by charting the program's expansion over fifty years, one finds that benefits became more generous and more widely available as mass immigration provided an ever increasing pool of taxpaying households ineligible for the pensions. Furthermore, when mass immigration ended following World War I, the mood of the country changed and the new veterans were treated far less generously.

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- Why then did the benefit system expand only much later?

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- Only with the start of mass immigration did this become politically feasible even though by then, the end of Reconstruction the South's opposition might otherwise have diluted the strength of the GAR.

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- In following years, a steady stream of legislation specified compensation for specific injuries, periodic increases in the rates to keep up with the rise in the cost of living.
- By 1872, the loss of two hands, two feet, or two eyes entitled a veteran to a pension of \$31.25 a month, as compared to an average wage of \$40.50.

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- By 1878, a veteran who had lost two limbs received $72, compared to an average wage of $31.58. This is the beginning of renewed mass migration to the U.S.

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- By 1907, the age was lowered to 62.
- By the act of 1912, anyone who had served 90 days during the war was entitled to a minimum of $13 a month and by the act of September 8, 1916, widows who had married veterans at any time prior to 1905 became entitled as well.

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- This was the period when immigration policy was becoming very restrictive.

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- *cédulas, were* transferable land mortgage bonds. Landowners and speculators obtained these fixed interest paying bonds to sell them on the open market in exchange for immediate capital.

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- Mortgages were taken on worthless land, no where near the 200 percent value of the loan that was the legal requirement or collateral.
- Second, the landowning, debtor class thoroughly controlled Argentine monetary policy.

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- The diminution of Argentina's ability to raise capital in the future as a result of the effective repudiation of the paper *cédulas*, was a cost borne by the population as a whole.

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