



BEUTH HOCHSCHULE FÜR TECHNIK BERLIN
University of Applied Sciences



Der demographische Wandel in Deutschland

DAV vor Ort - qx-Club Berlin

5. Dezember 2011

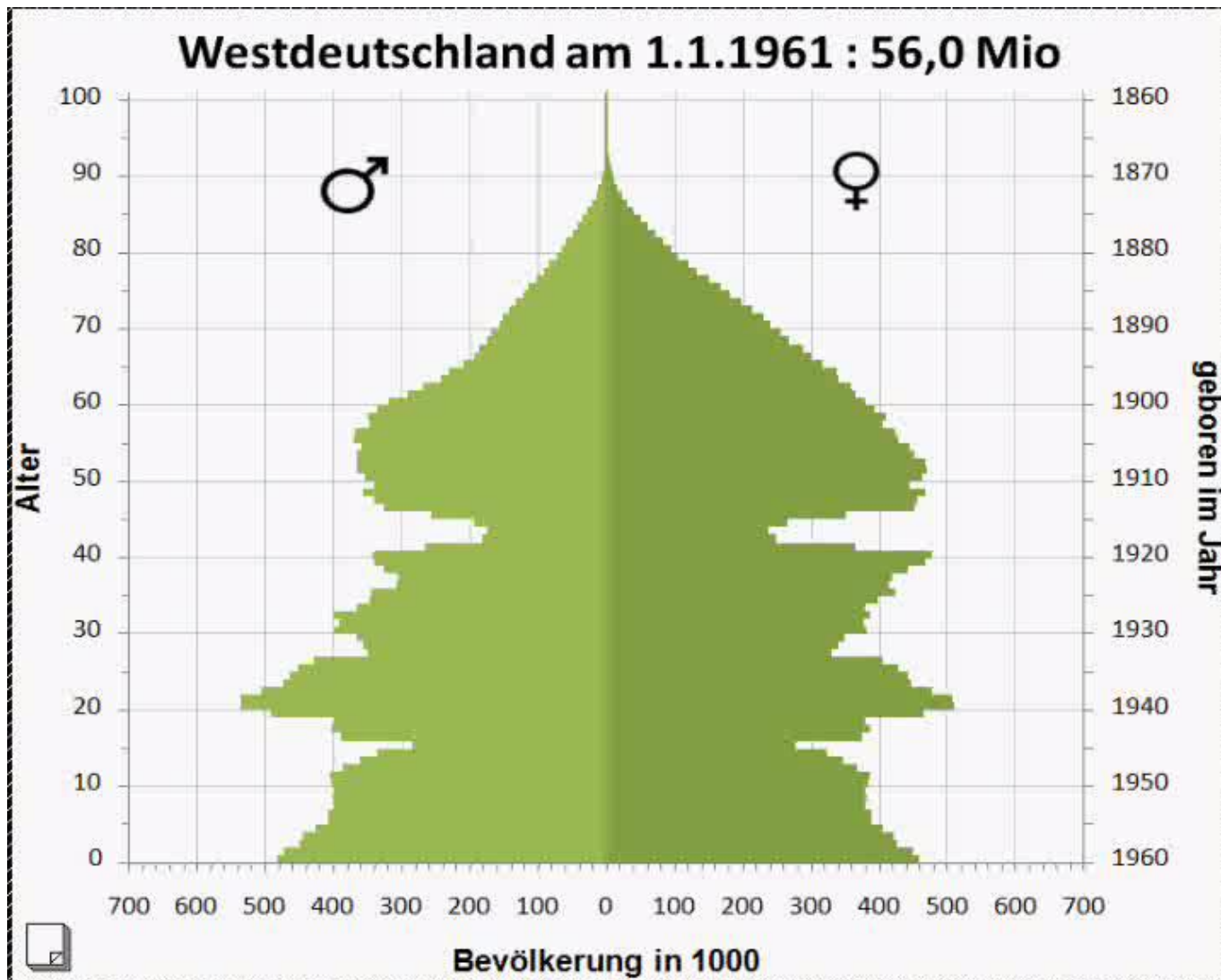
Dipl-Math (FH) Steven Kunde

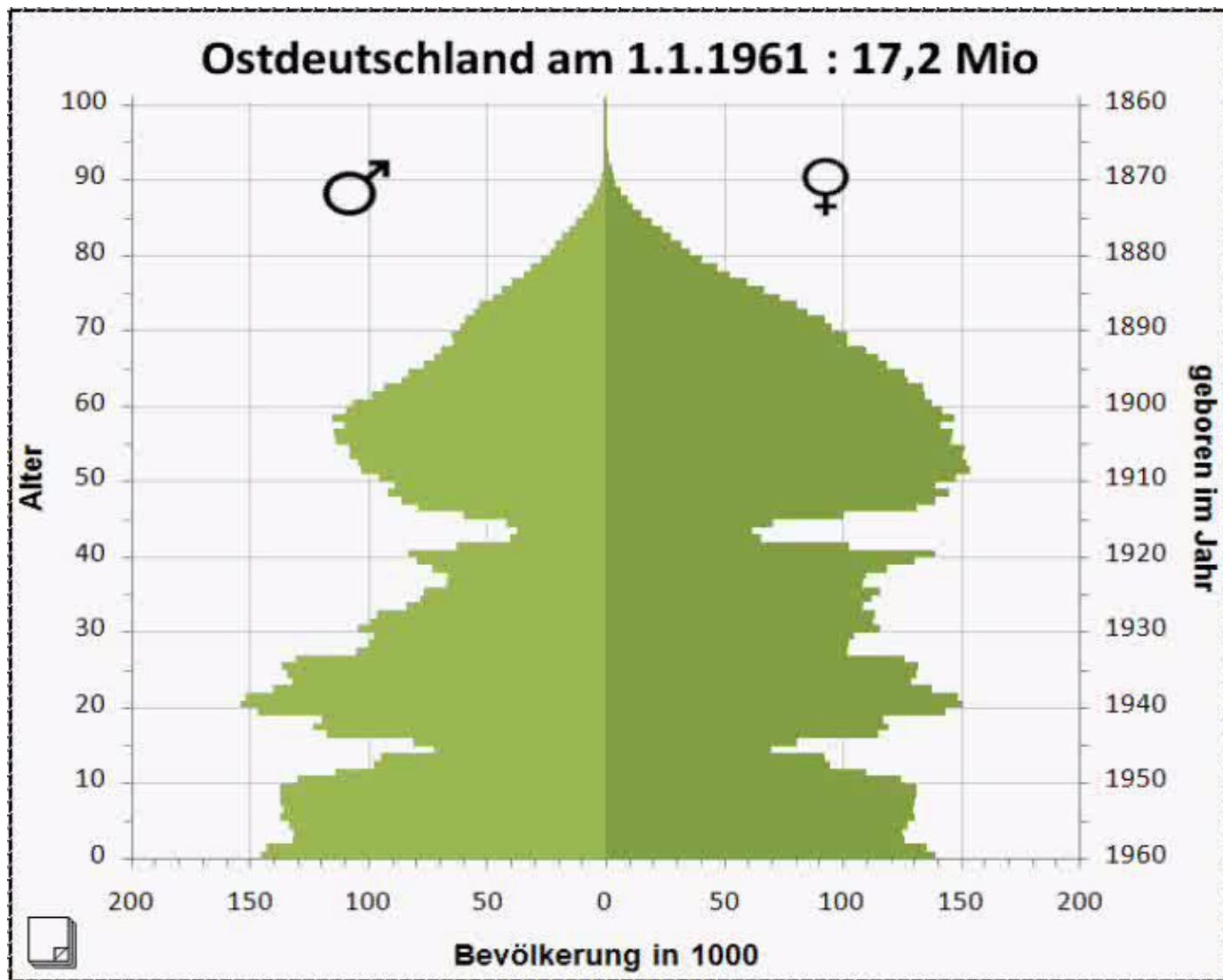
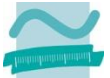
Prof. Dr. Karl Michael Ortmann

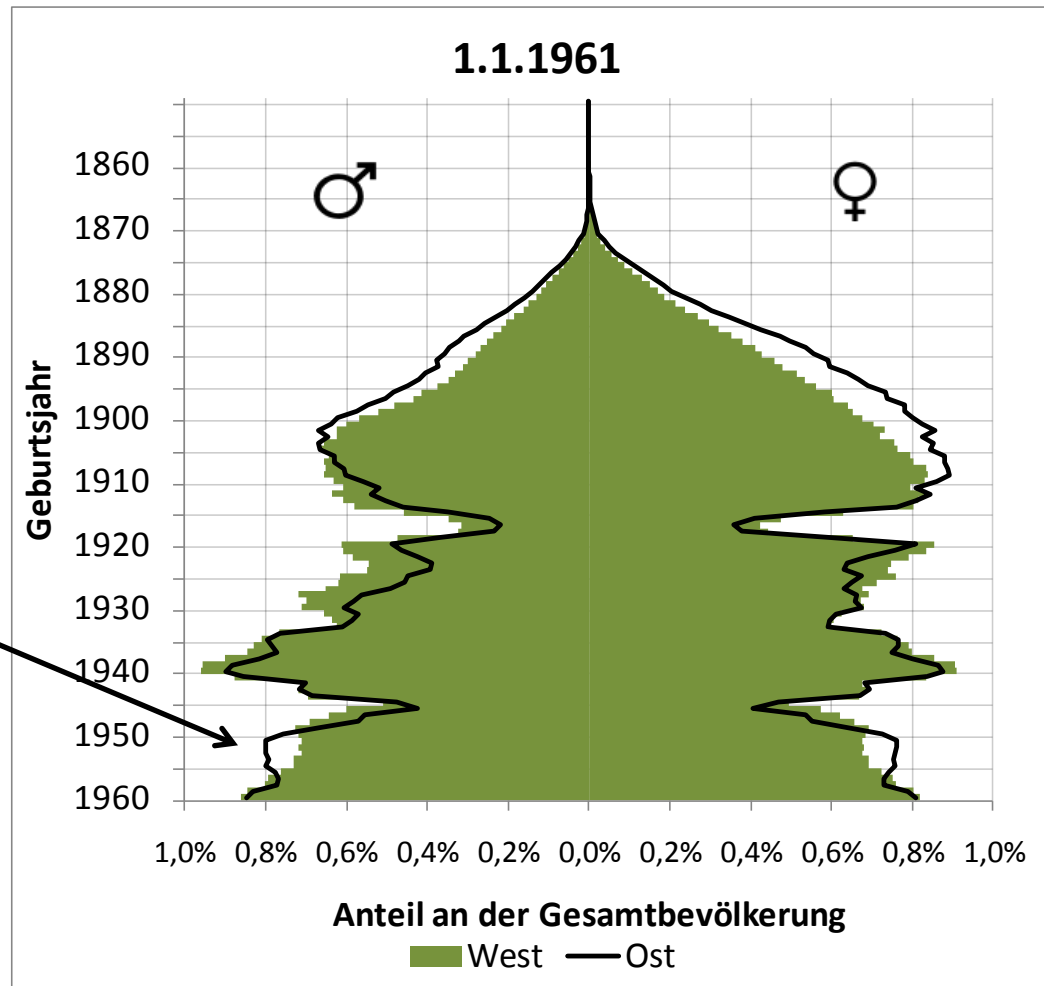


- Bevölkerungsentwicklung in Ost- und Westdeutschland in den letzten fünfzig Jahren
- Bevölkerungsprognose für Gesamtdeutschland bis 2050
- Auswirkungen für die Lebensversicherung

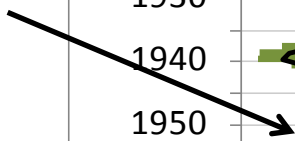


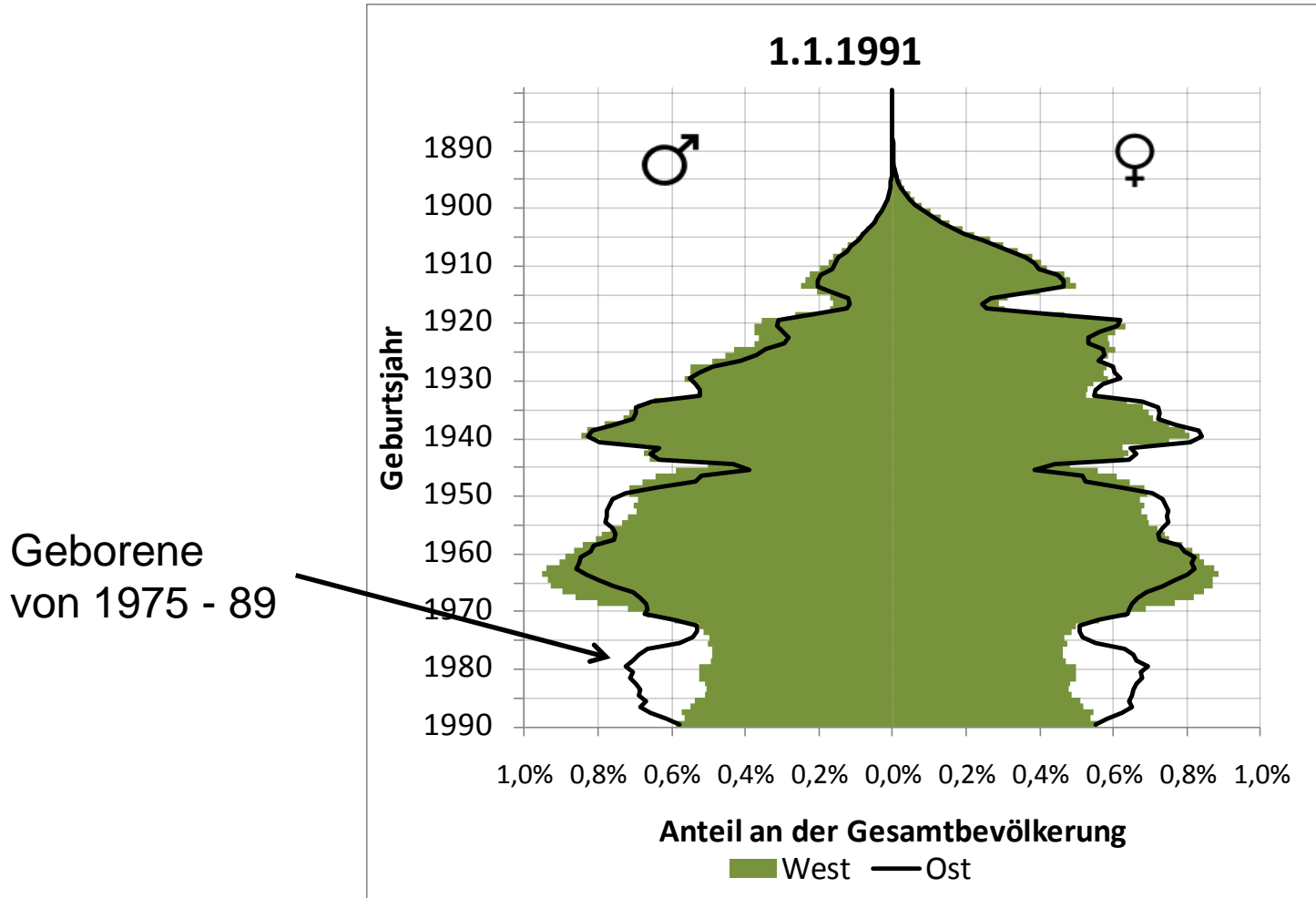


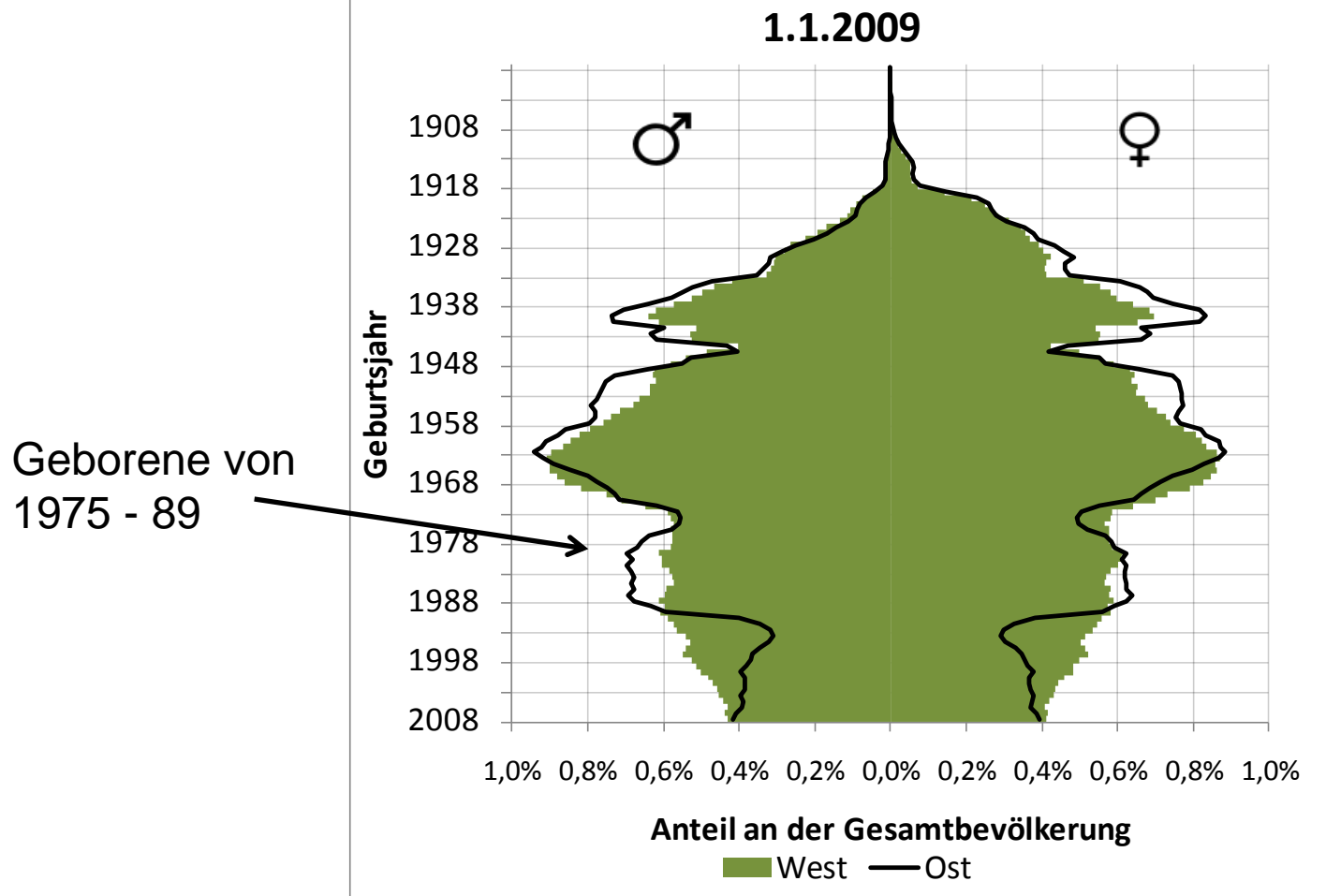




Geborene
von 1950 - 55

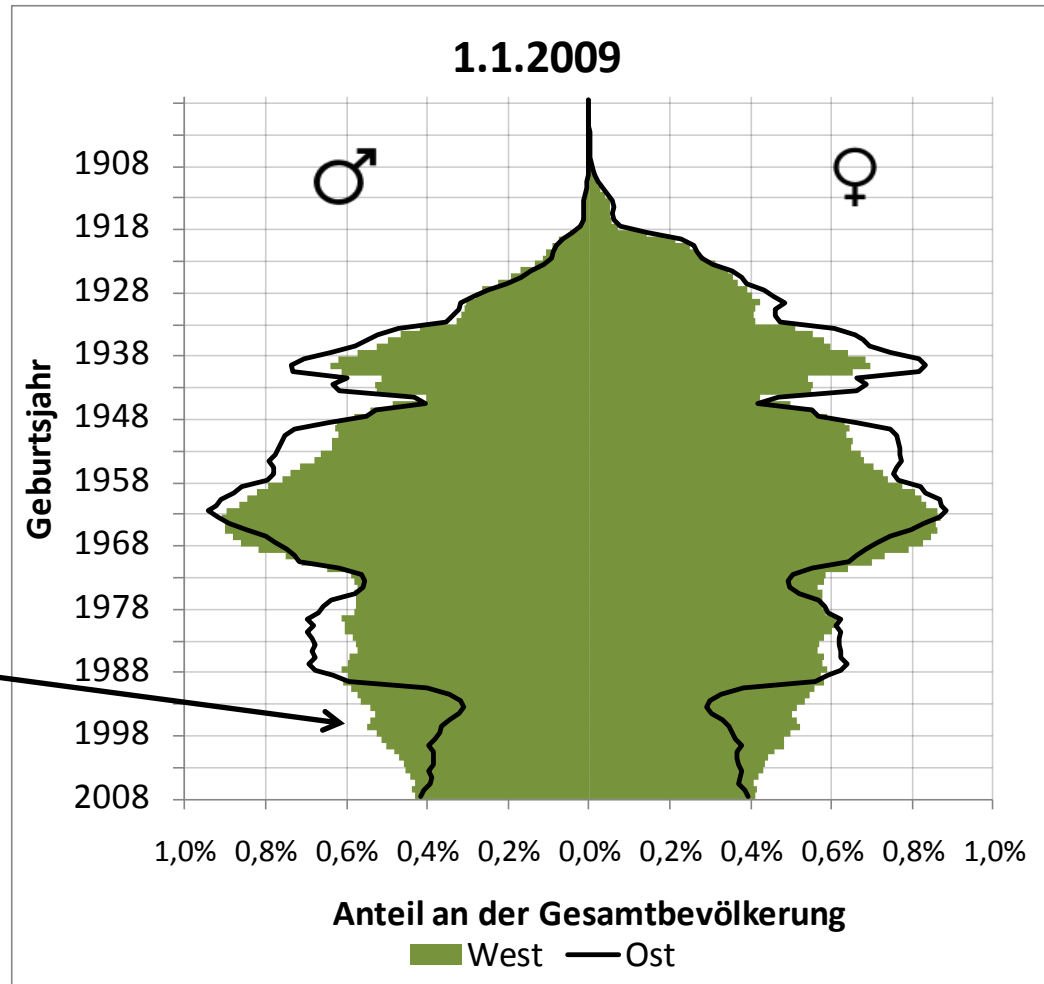
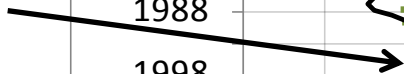


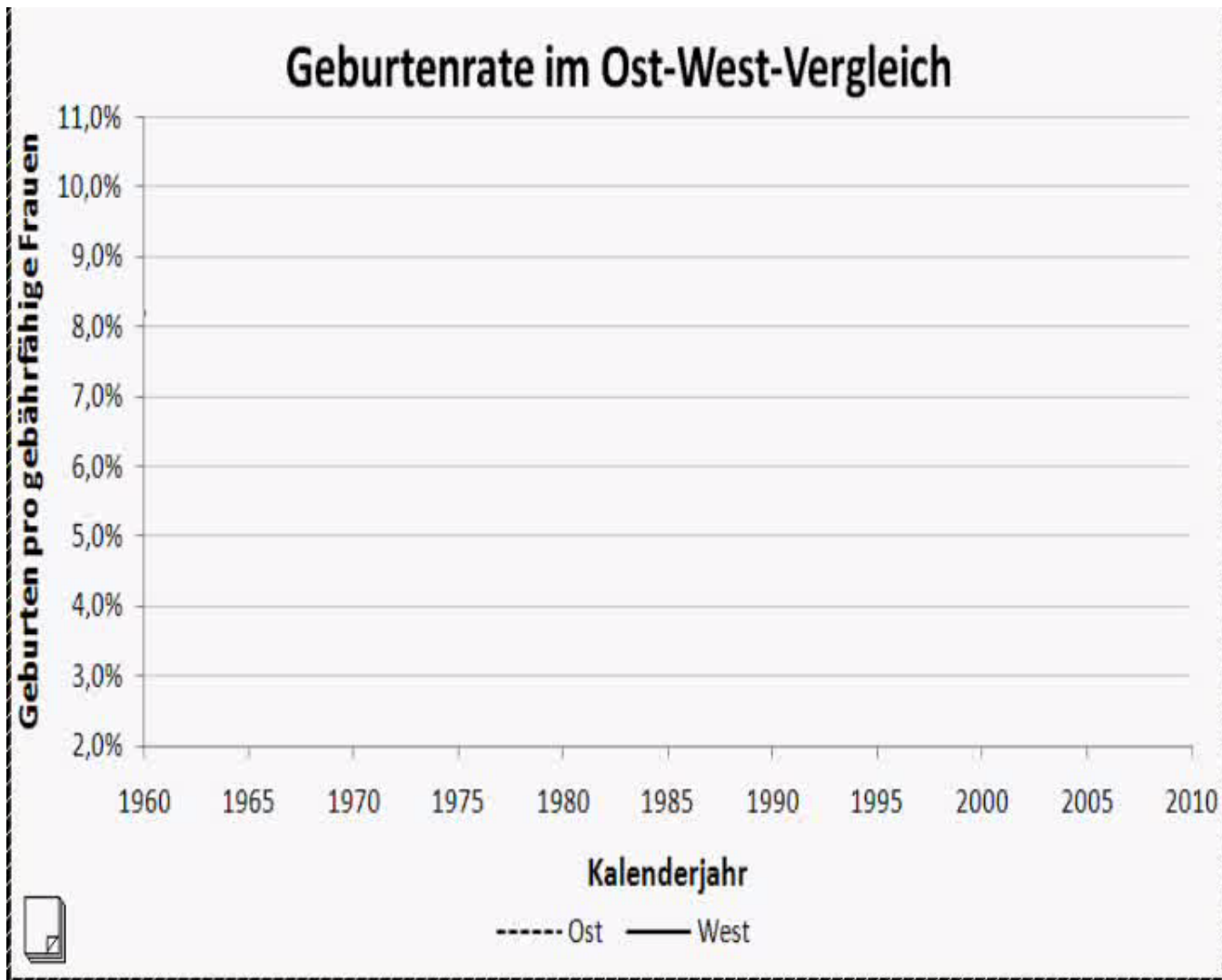


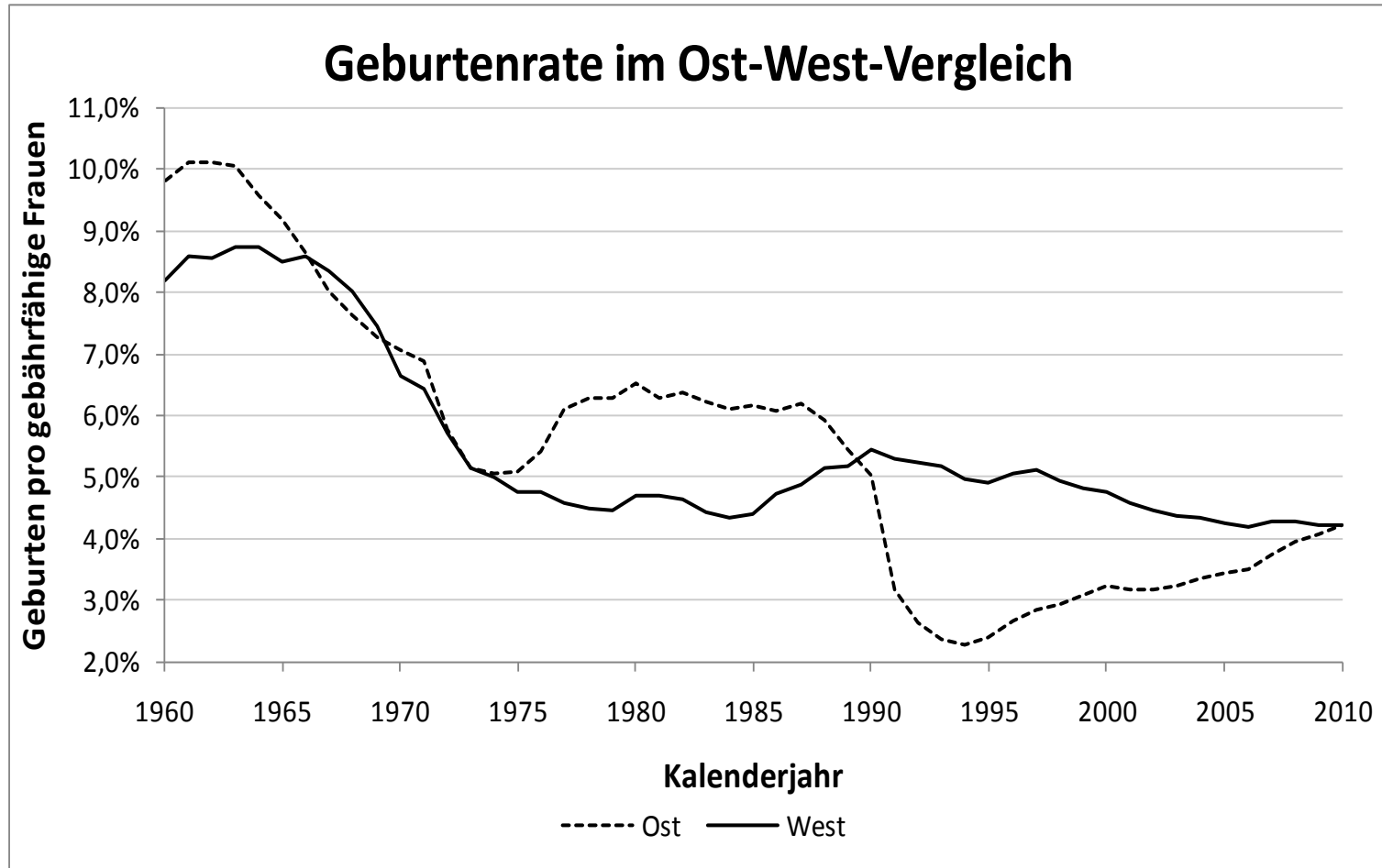


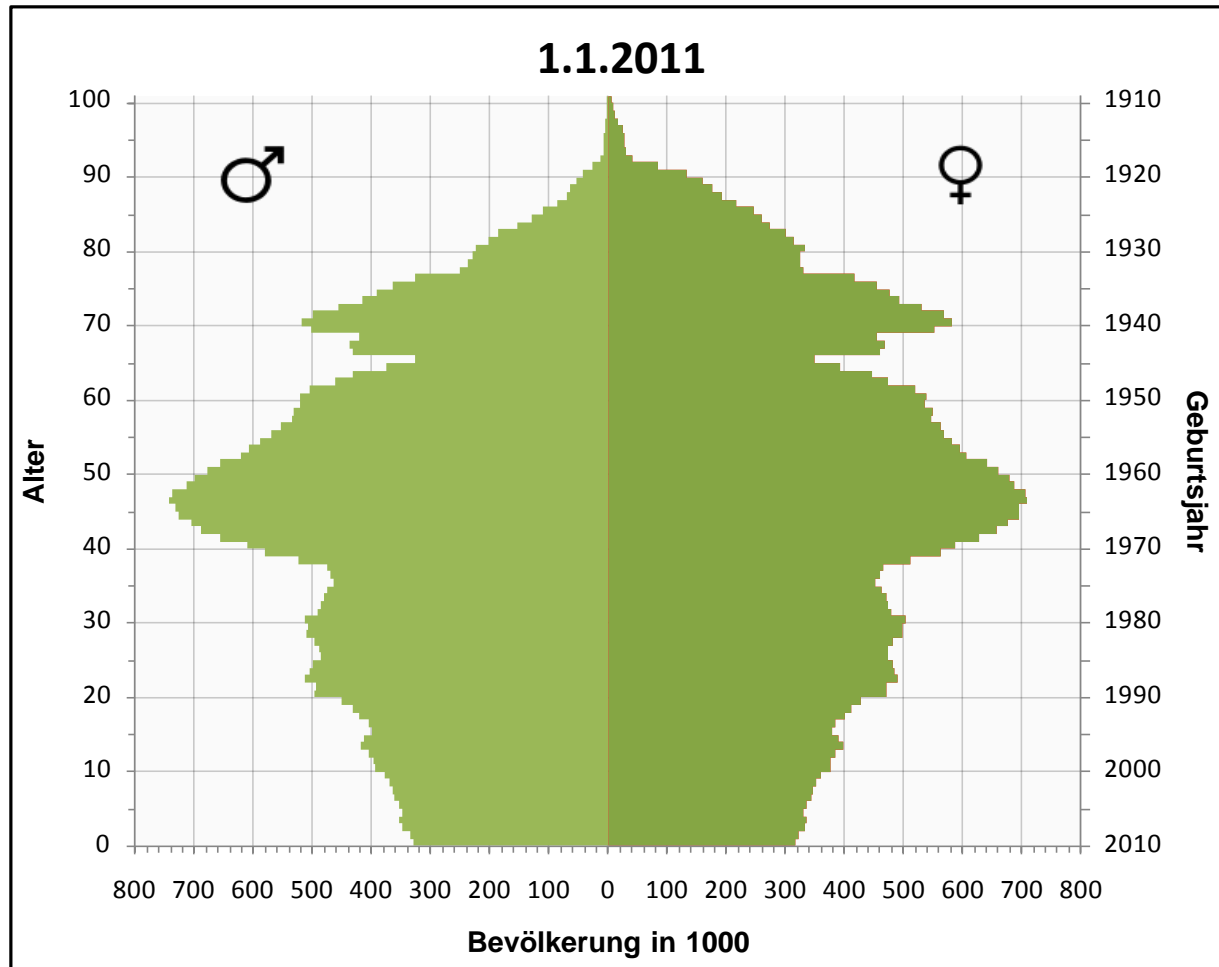


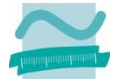
Geborene von
1990 - 2009

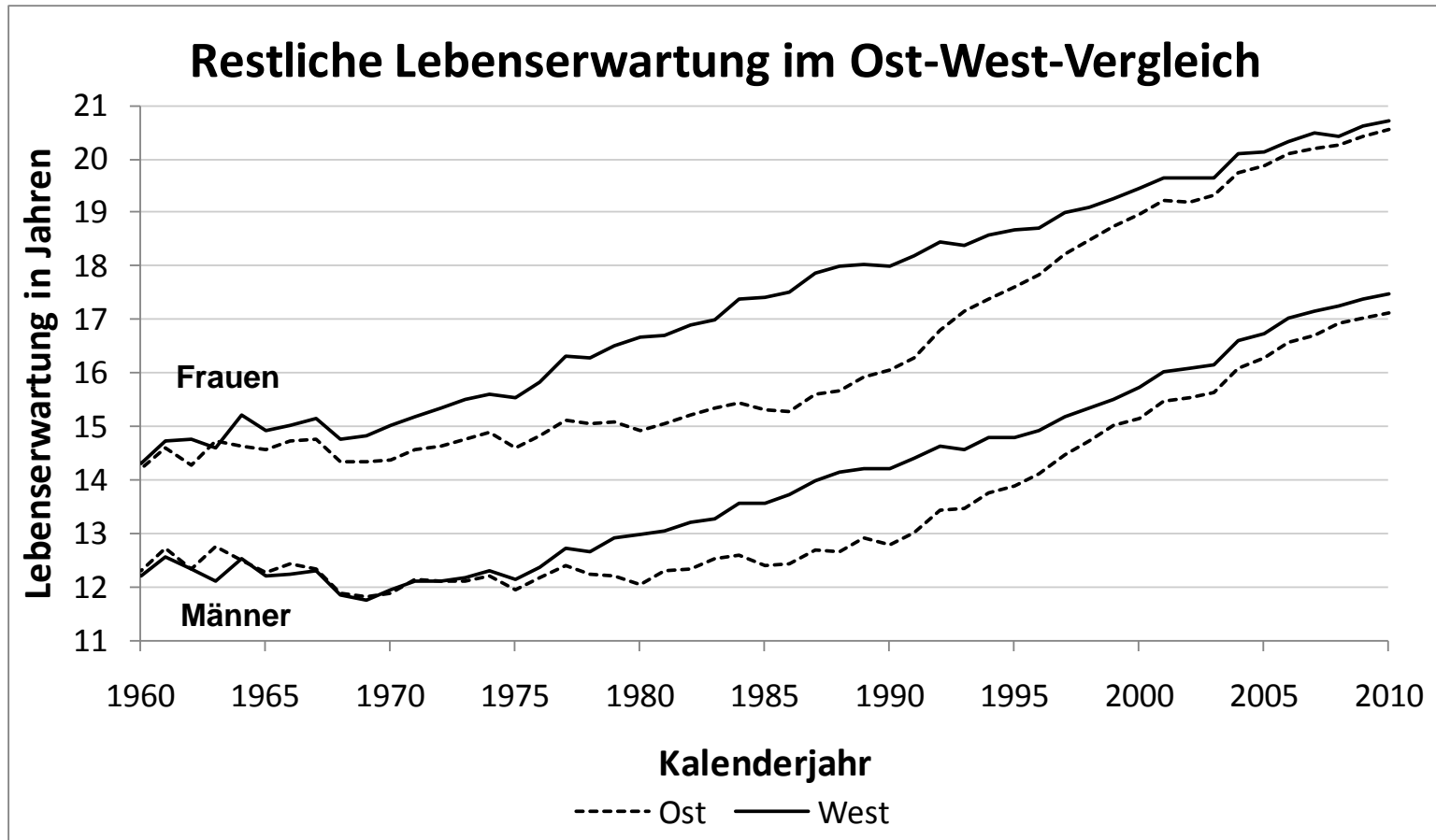
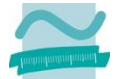


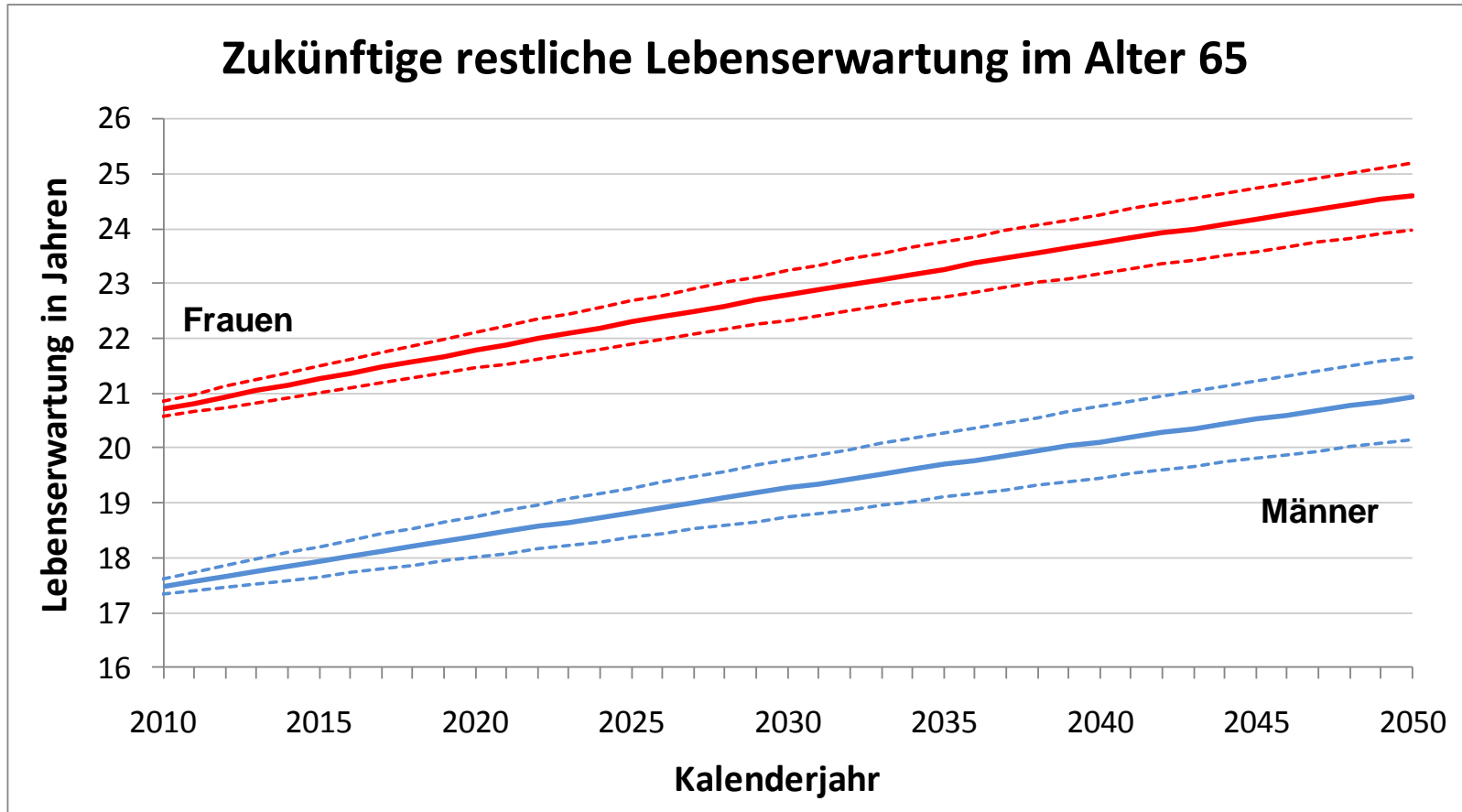
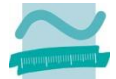


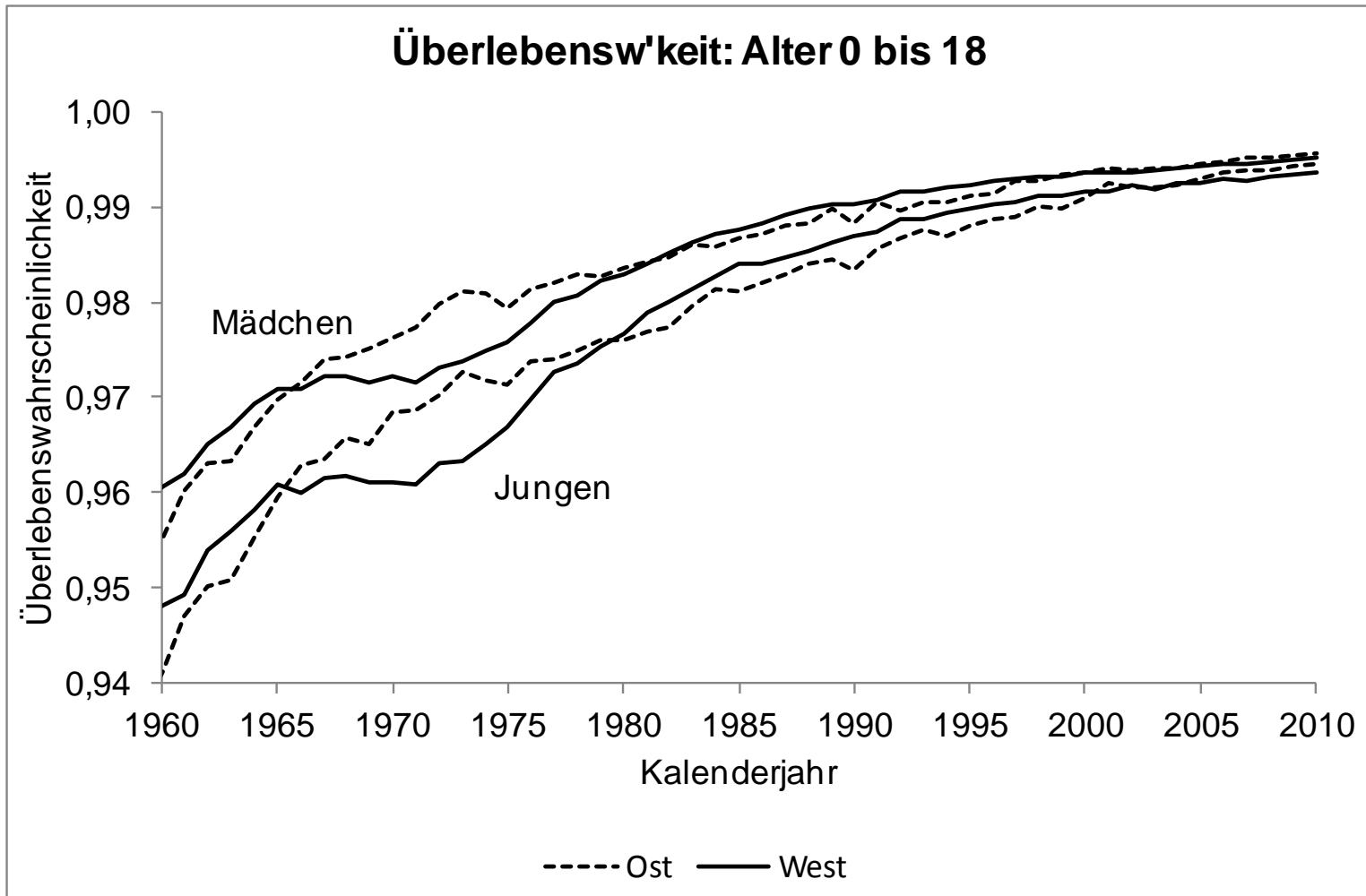
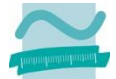


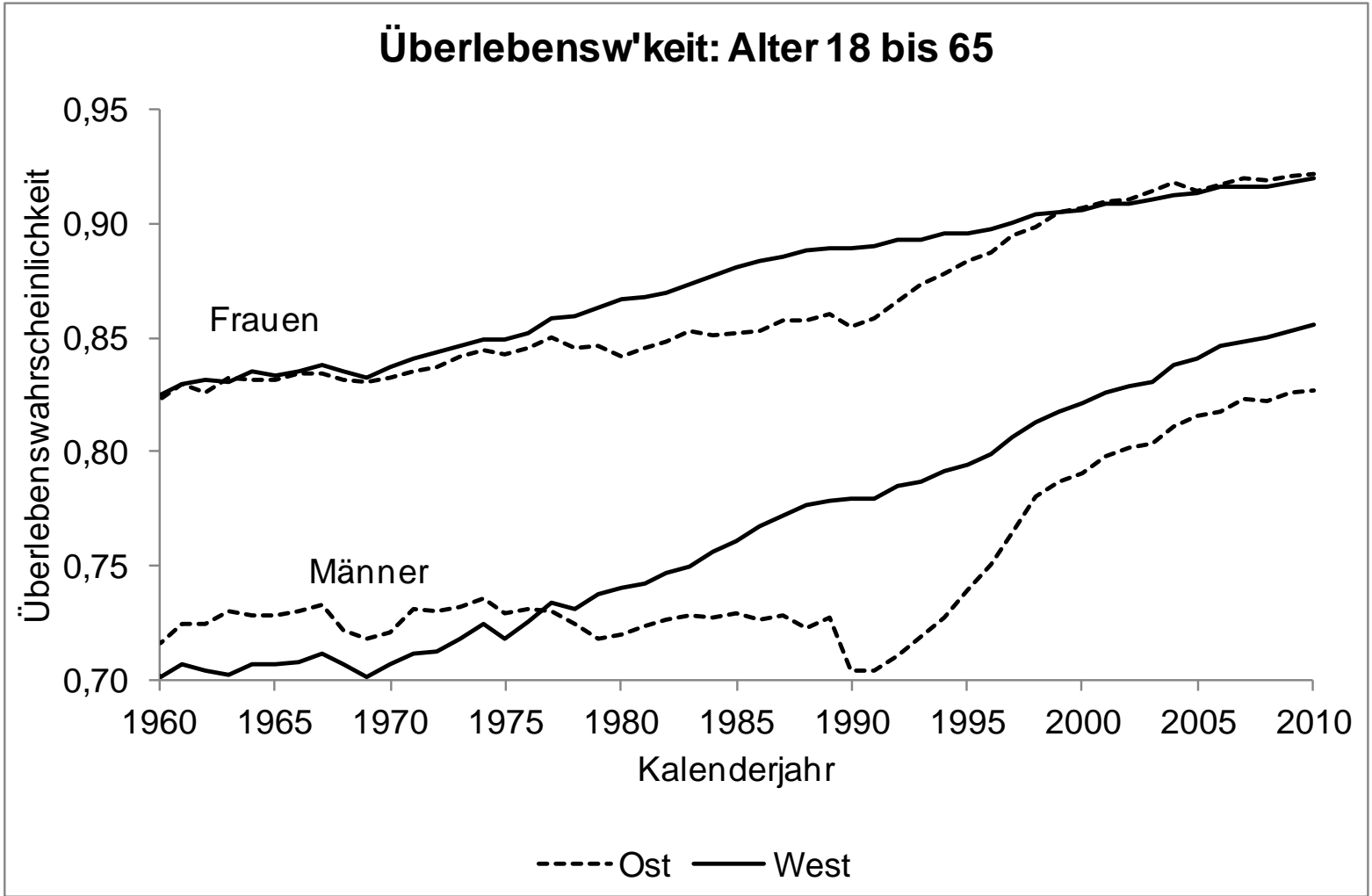


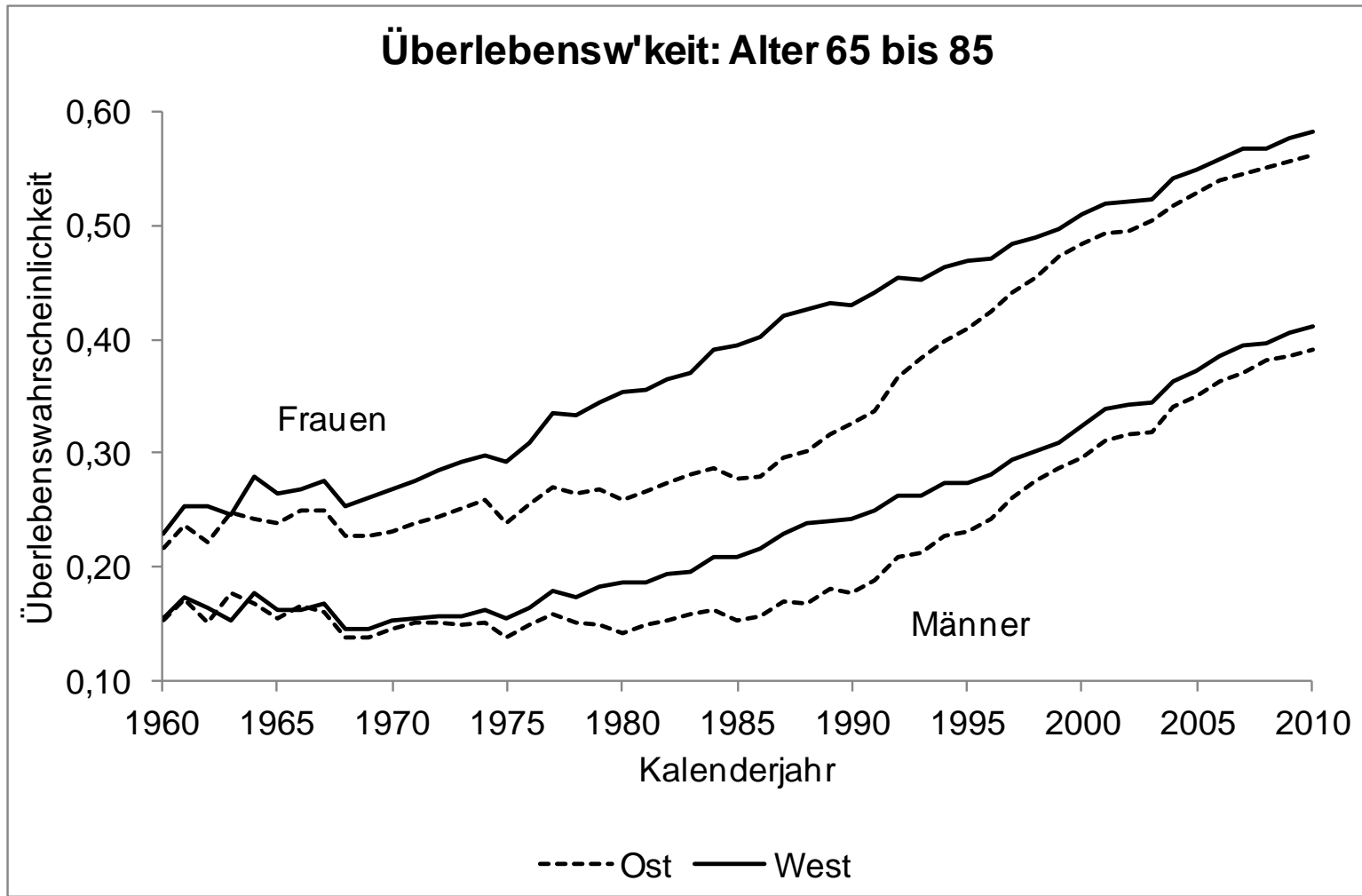
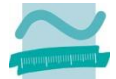






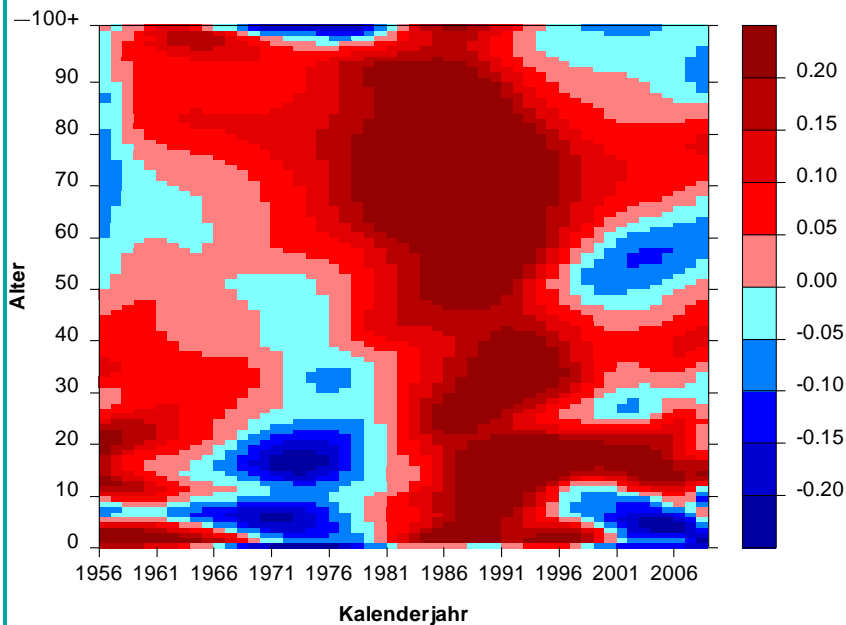




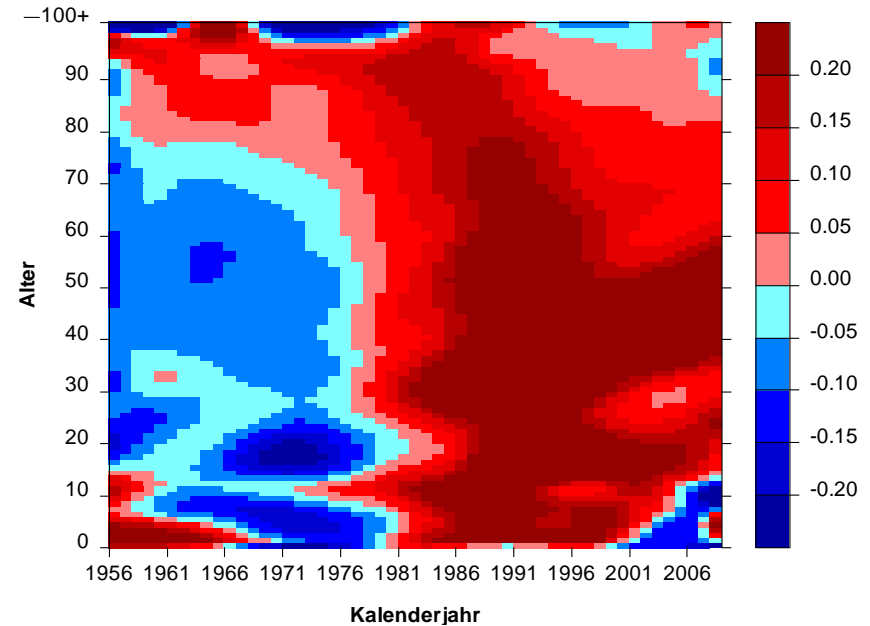


$$M_{x,t} = \frac{\hat{q}_{x,t}^{Ost}}{\hat{q}_{x,t}^{West}} - 1$$

Frauen



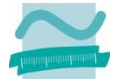
Männer



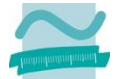
- Berechnung von Todesfalleistungsbarwerten
- für verschiedene Eintrittsalter und Vertragslaufzeiten
- anhand zweier Sterbetafeln, hier:
Ostdeutsche Bevölkerungsterblichkeit 2008 Männer vs.
DAV 2008 TM 1. Ordnung
- Vergleich der Quotienten, für einzelne Verträge und im gewichteten Mittel

Der Sterbetafelvergleich ist ein probates Mittel der Rückversicherer zum Einschätzen des Niveaus einer Sterbetafel im Vergleich zu einer anderen.

Sterbetafelvergleich - Ergebnisse



Alter	Laufzeit						
	5	10	15	20	25	30	Mittel
20	66%	73%	81%	89%	101%	110%	98%
25	84%	92%	100%	111%	119%	122%	116%
30	101%	109%	119%	125%	126%	123%	124%
35	115%	126%	129%	129%	124%	116%	123%
40	134%	133%	131%	125%	116%	101%	119%
45	133%	131%	124%	115%	100%	89%	107%
50	130%	122%	113%	97%	87%	85%	99%
55	118%	109%	93%	84%	83%	85%	91%
60	103%	87%	80%	80%	83%	88%	85%
Mittel	113%	106%	102%	101%	97%	94%	99%



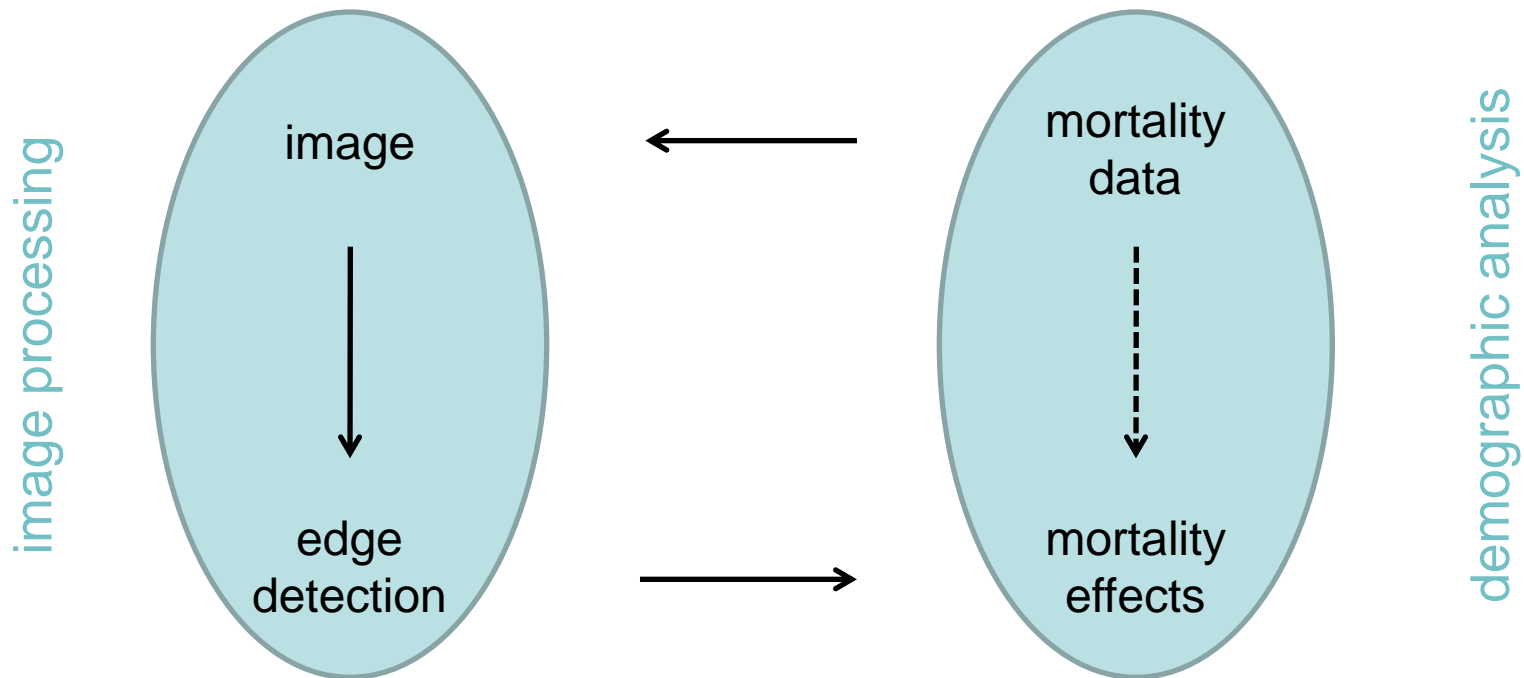
- Sterbewahrscheinlichkeit

$$\hat{q}_{x,t}$$

- Entwicklungsfaktoren

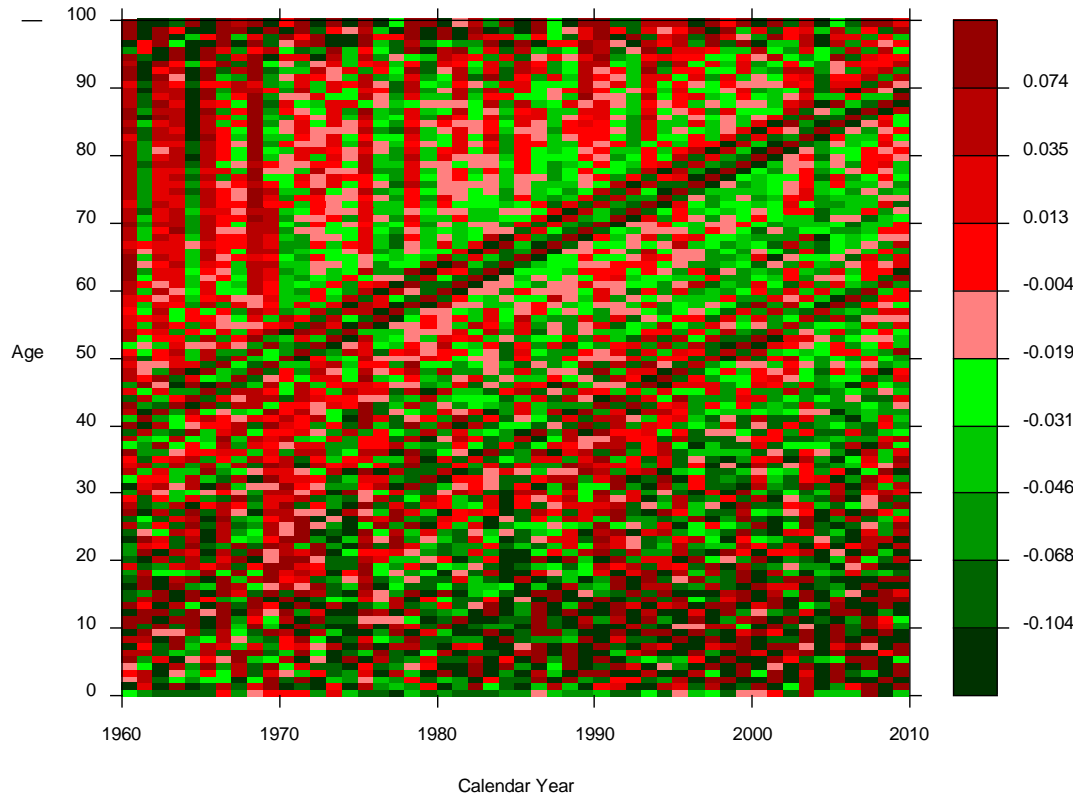
$$IF(x,t) = \frac{\hat{q}_{x,t}}{\hat{q}_{x,t-1}} - 1$$

- Techniken der Bildverarbeitung werden auf Sterblichkeitsanalysen angewendet,
- um Muster zu entdecken: Alters-, Perioden- und Kohorteneffekte

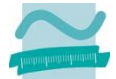


Canny algorithm

- data
- standardising
- smoothing
- gradient estimation
- separating & tracking
- non-maxima suppression
- hysteresis thresholding
- feature extraction

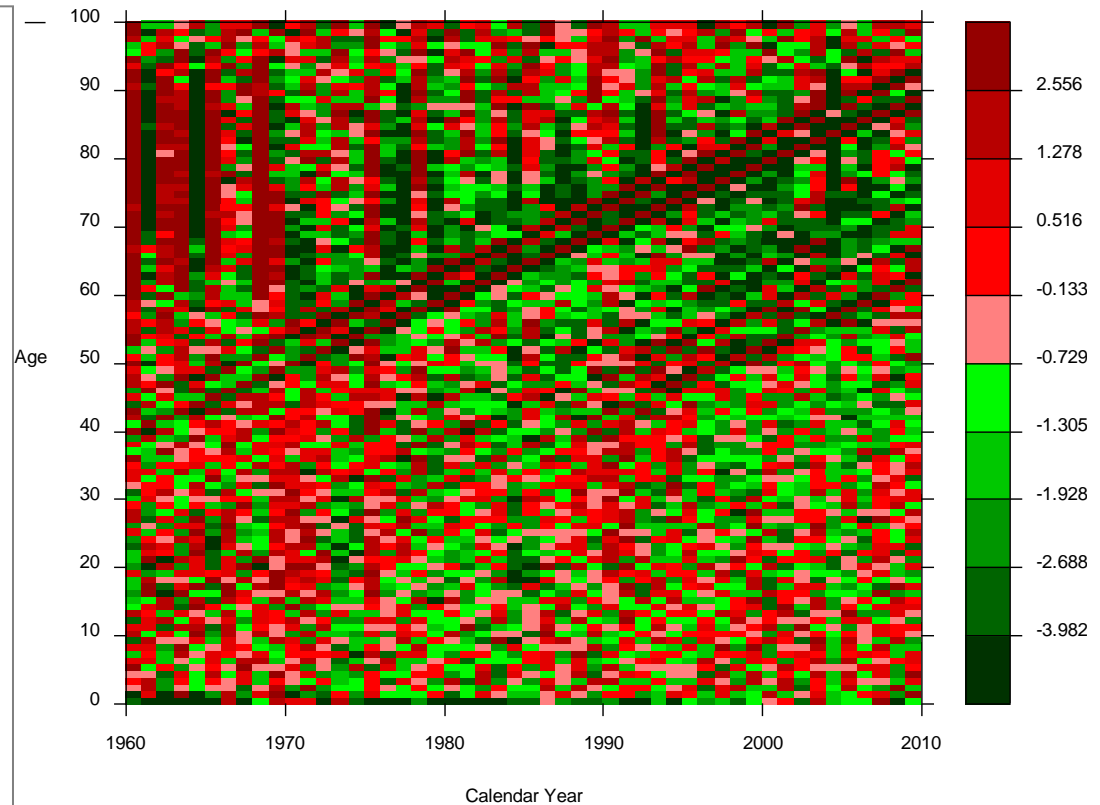


$$IF(x, t) = \frac{\hat{q}_{x,t}}{\hat{q}_{x,t-1}} - 1$$



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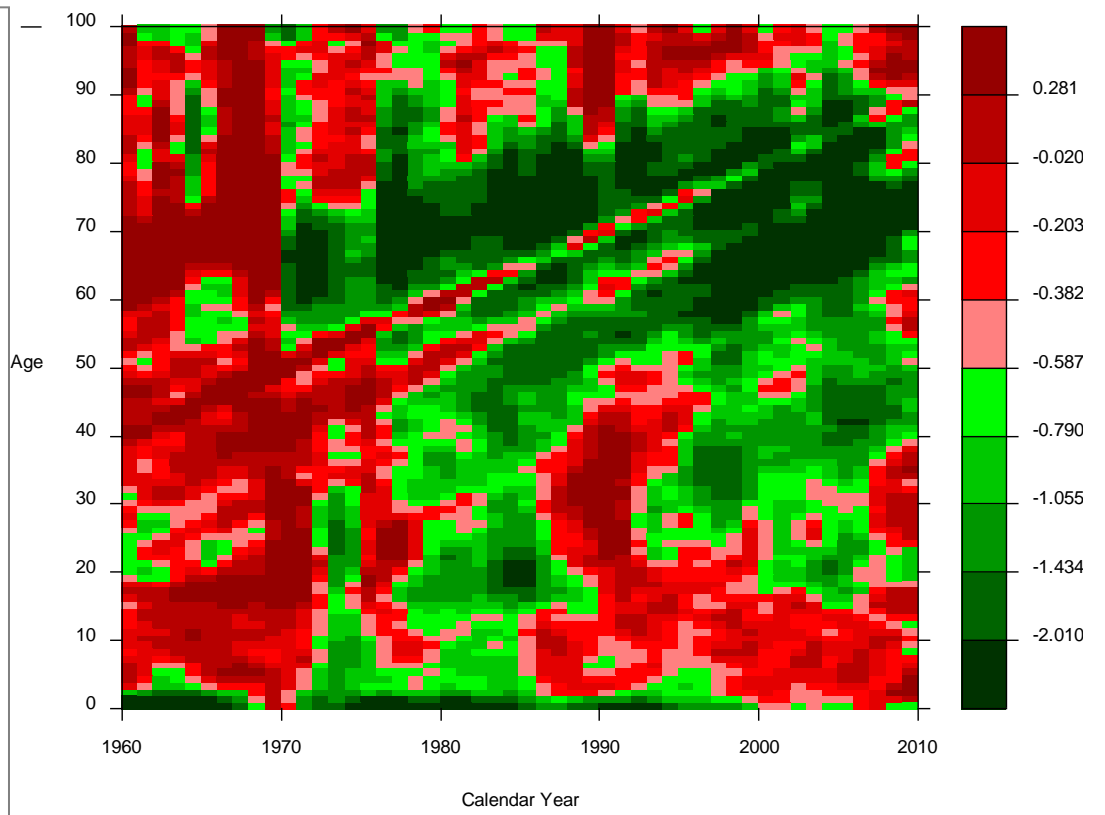
$$\overline{IF}(x, t) = IF(x, t) \cdot \sqrt{\frac{E_{x,t-1} \cdot \hat{q}_{x,t-1}}{1 - \hat{q}_{x,t-1}}}$$





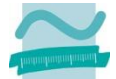
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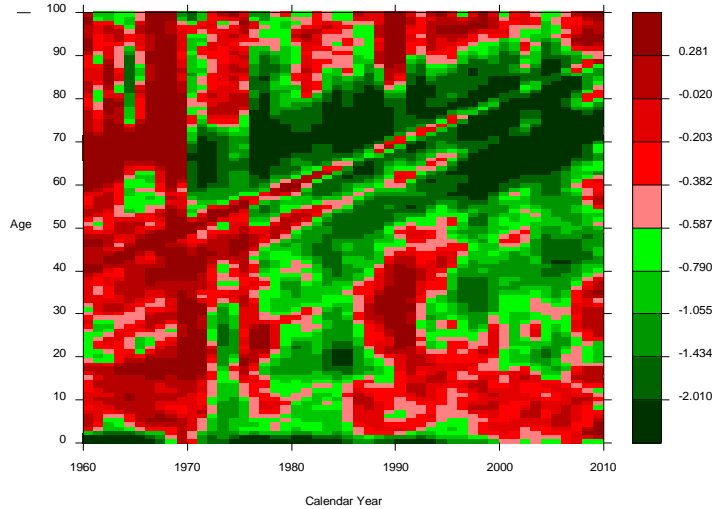


$$g_{\sigma}(x, t) = \frac{1}{2\pi\sigma^2} \exp\left(-\frac{x^2 + t^2}{2\sigma^2}\right)$$

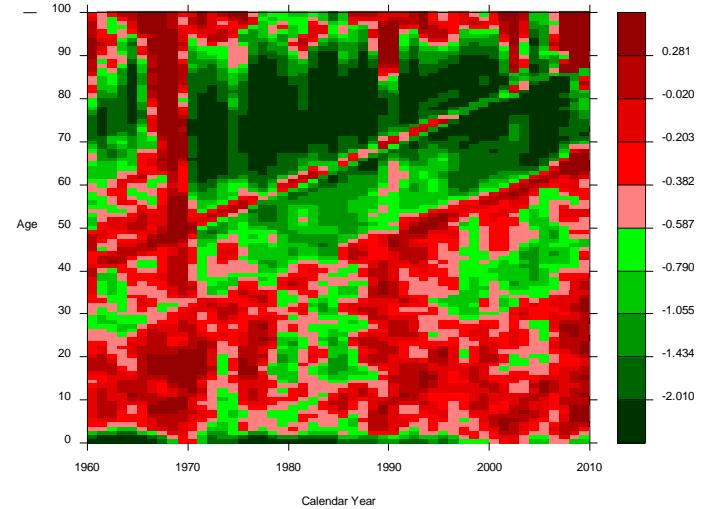




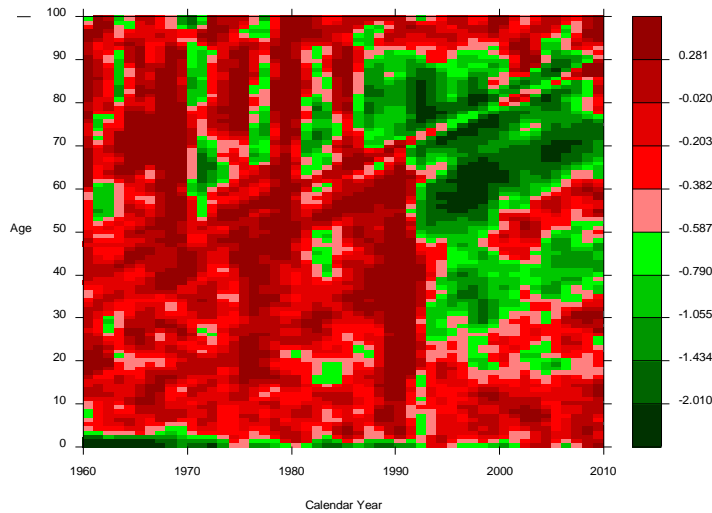
West - Männer



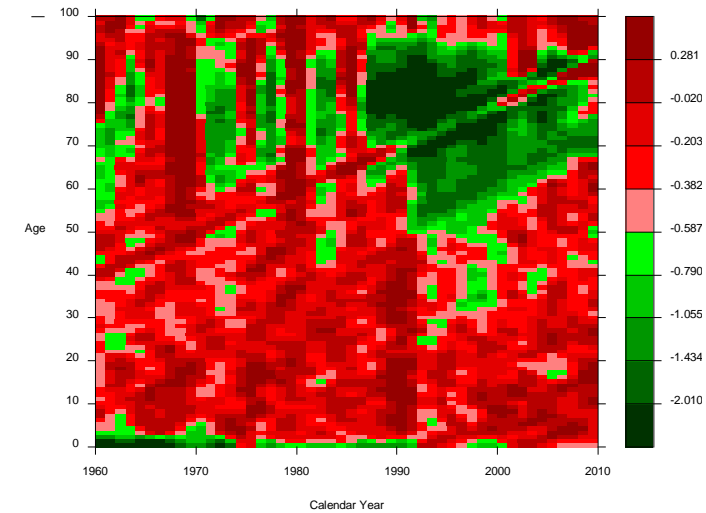
West - Frauen



Ost - Männer

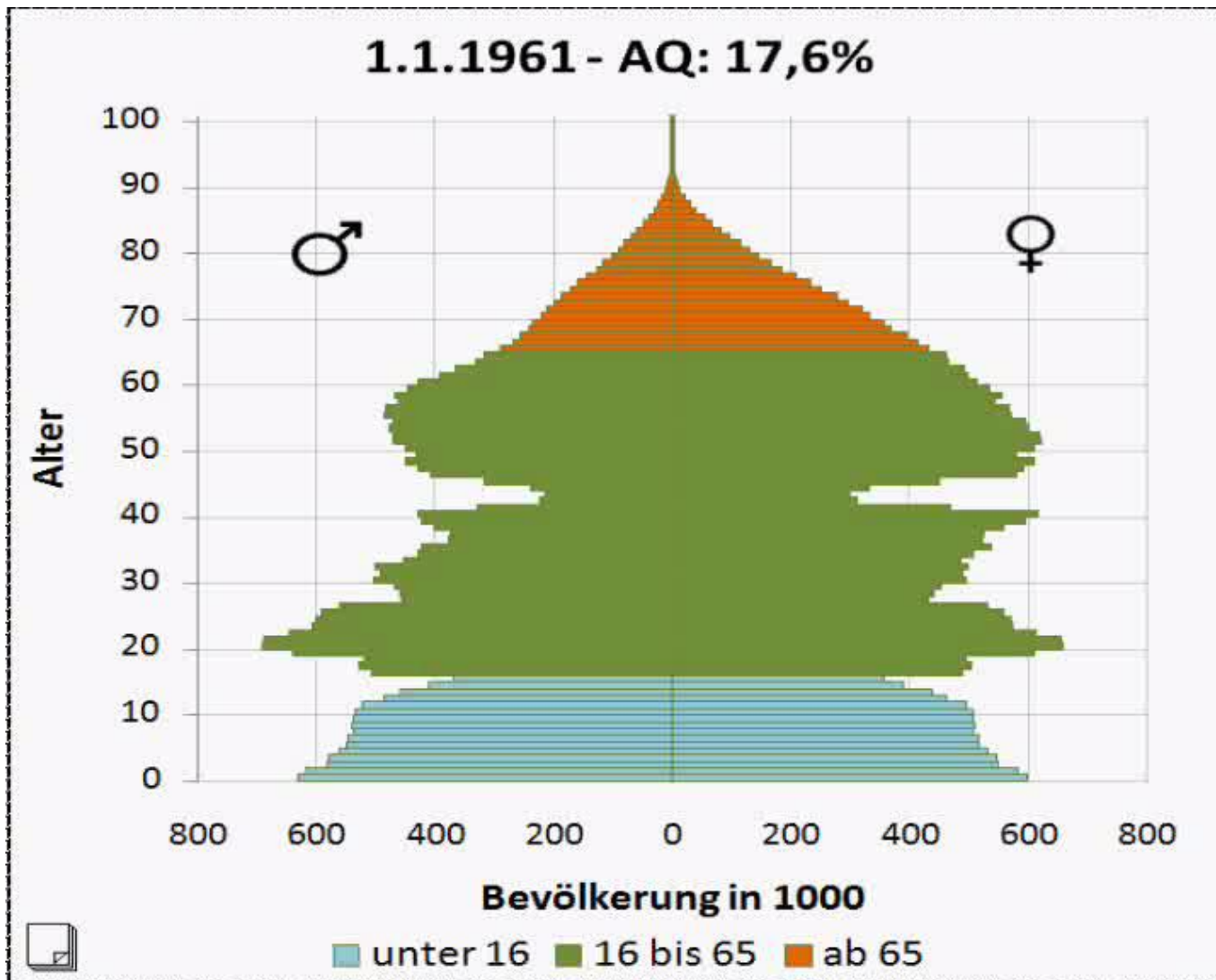


Ost - Frauen



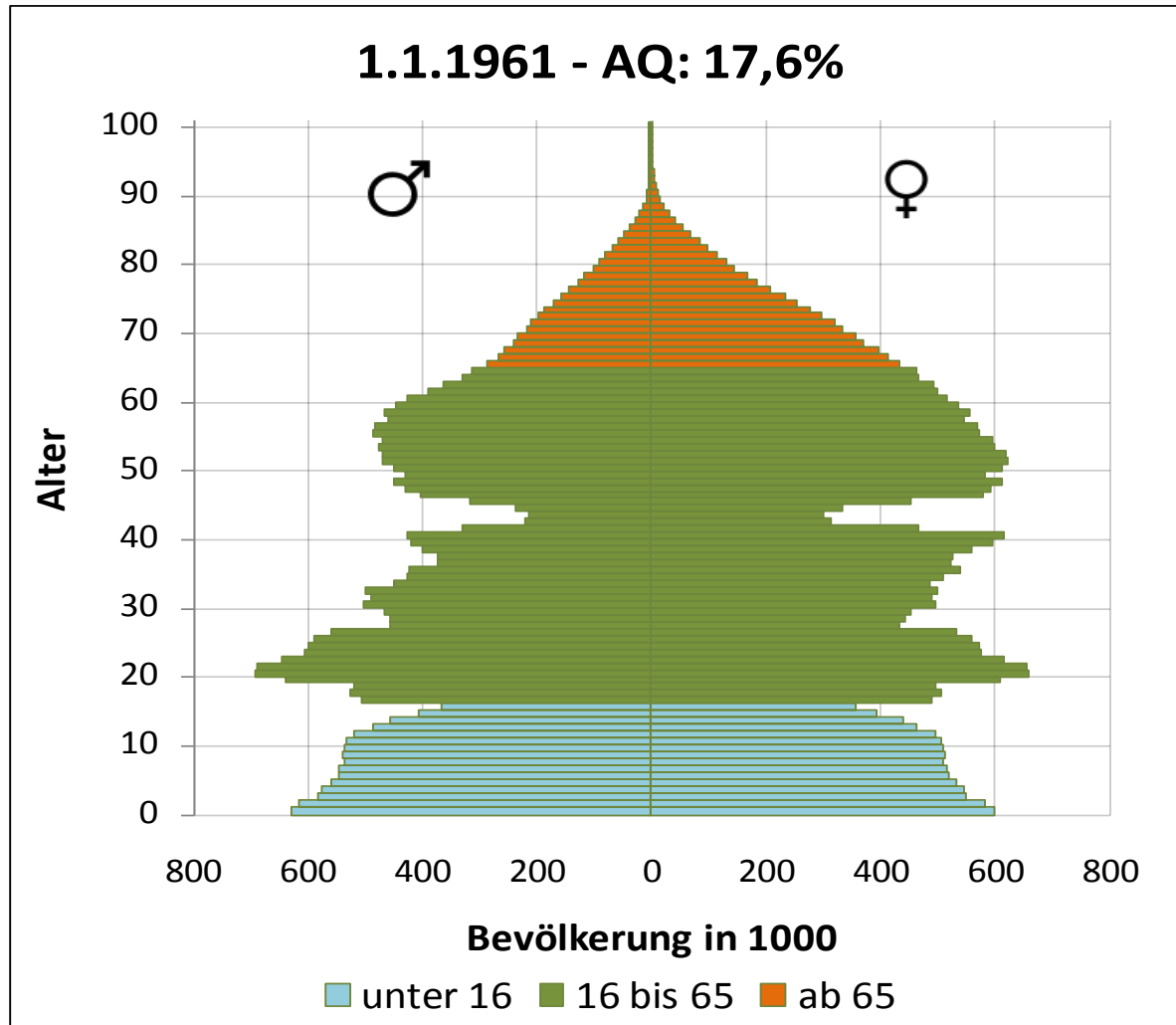


Altersquotient



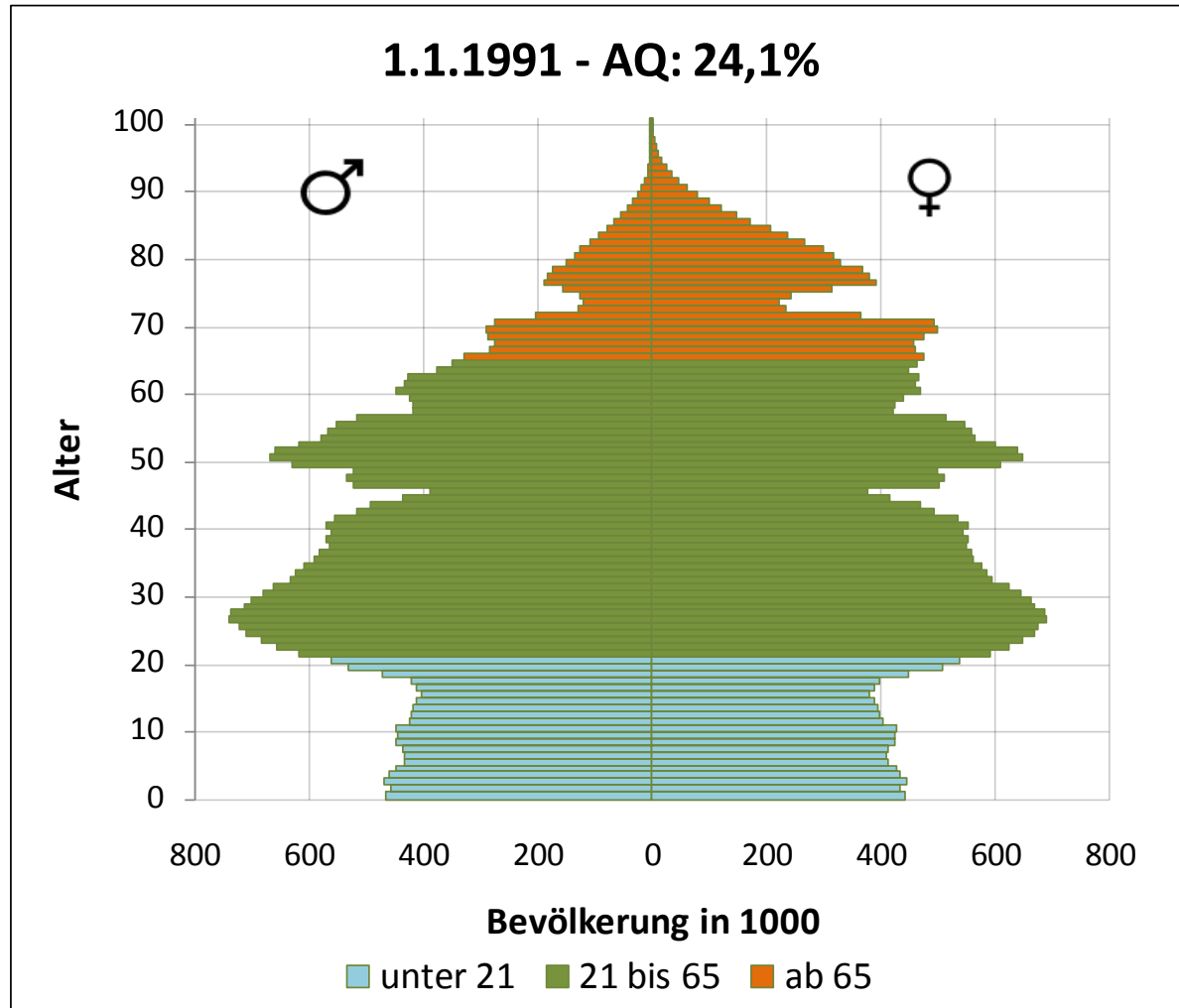


Altersquotient - 1960



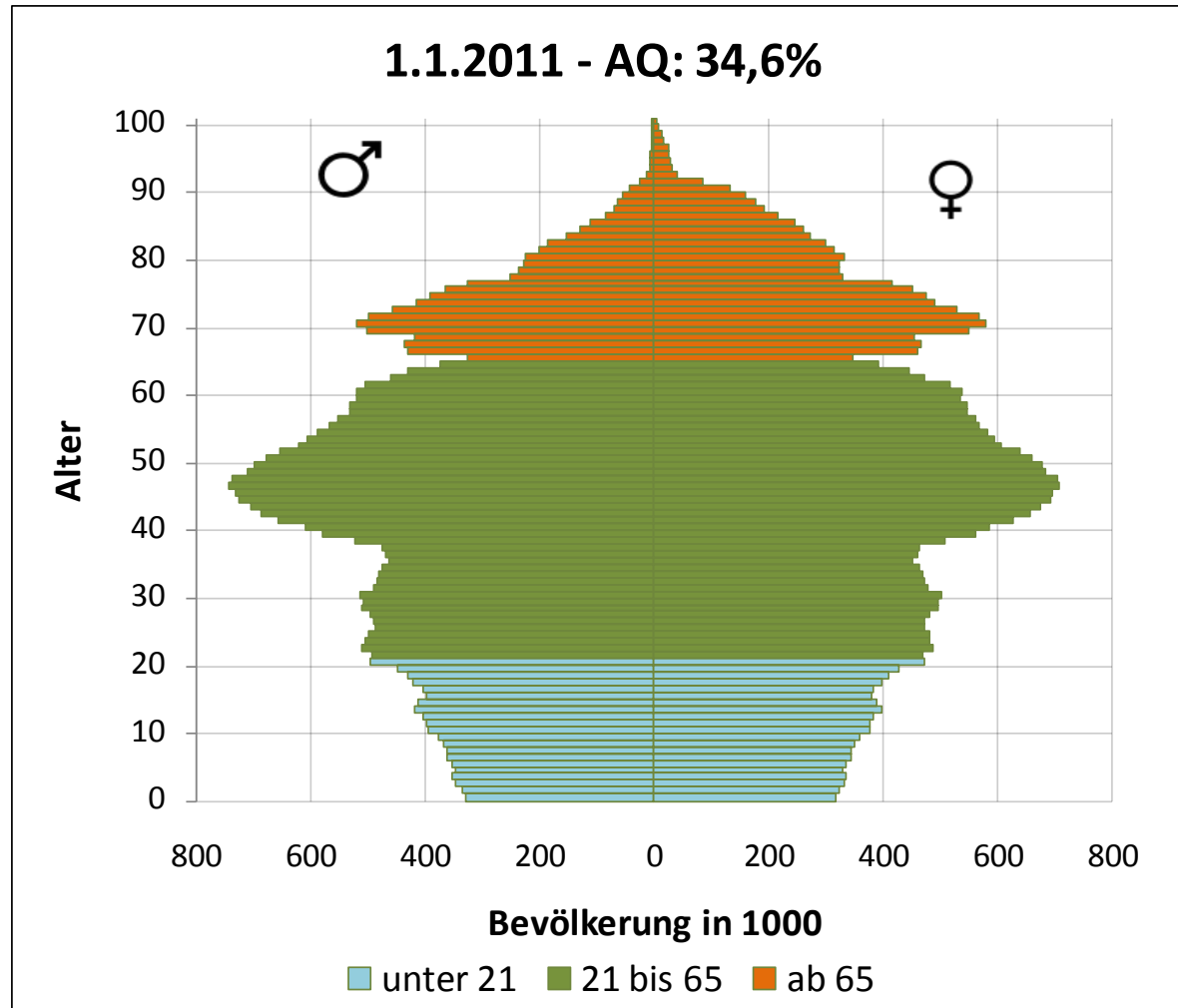
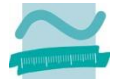


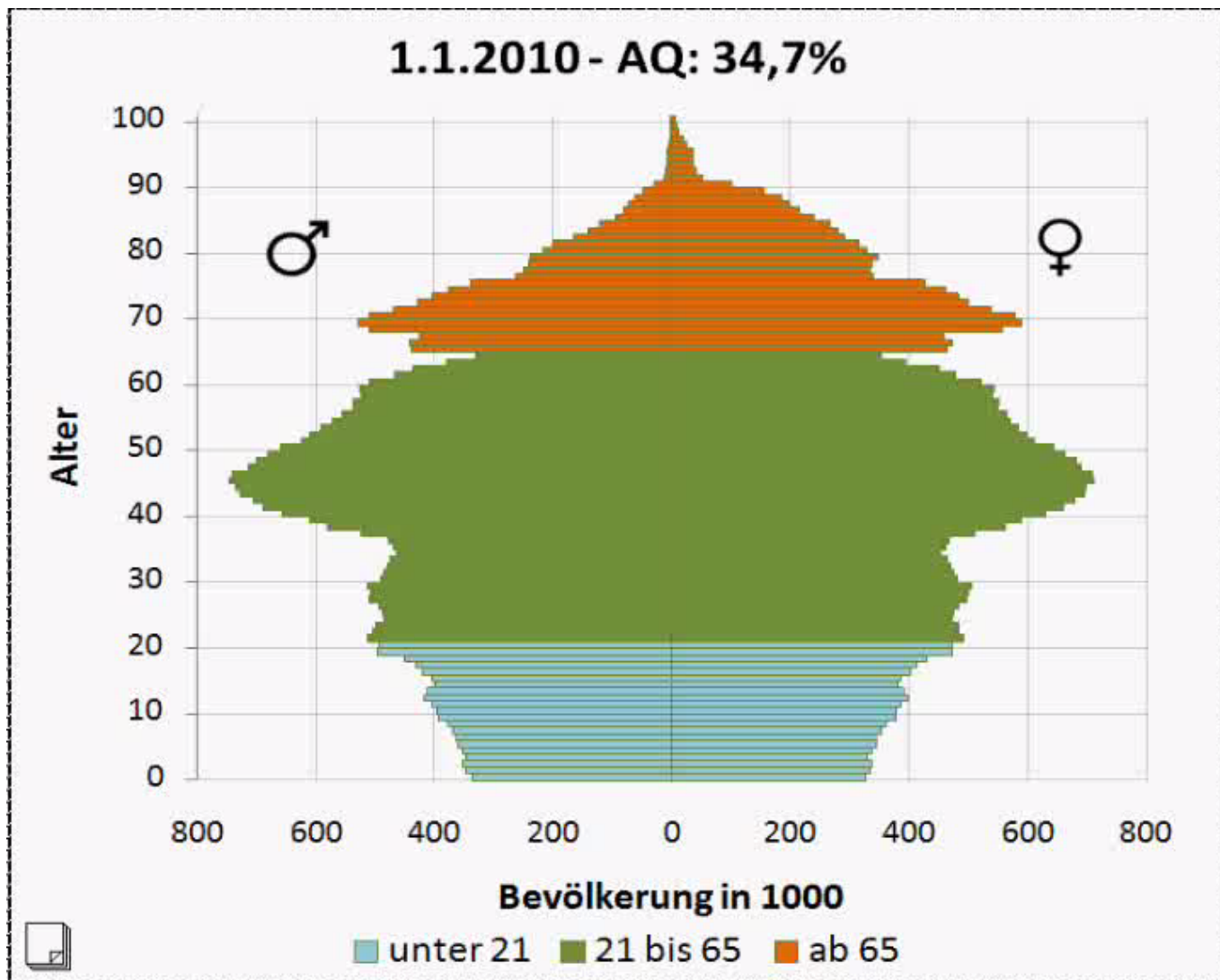
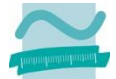
Altersquotient - 1990

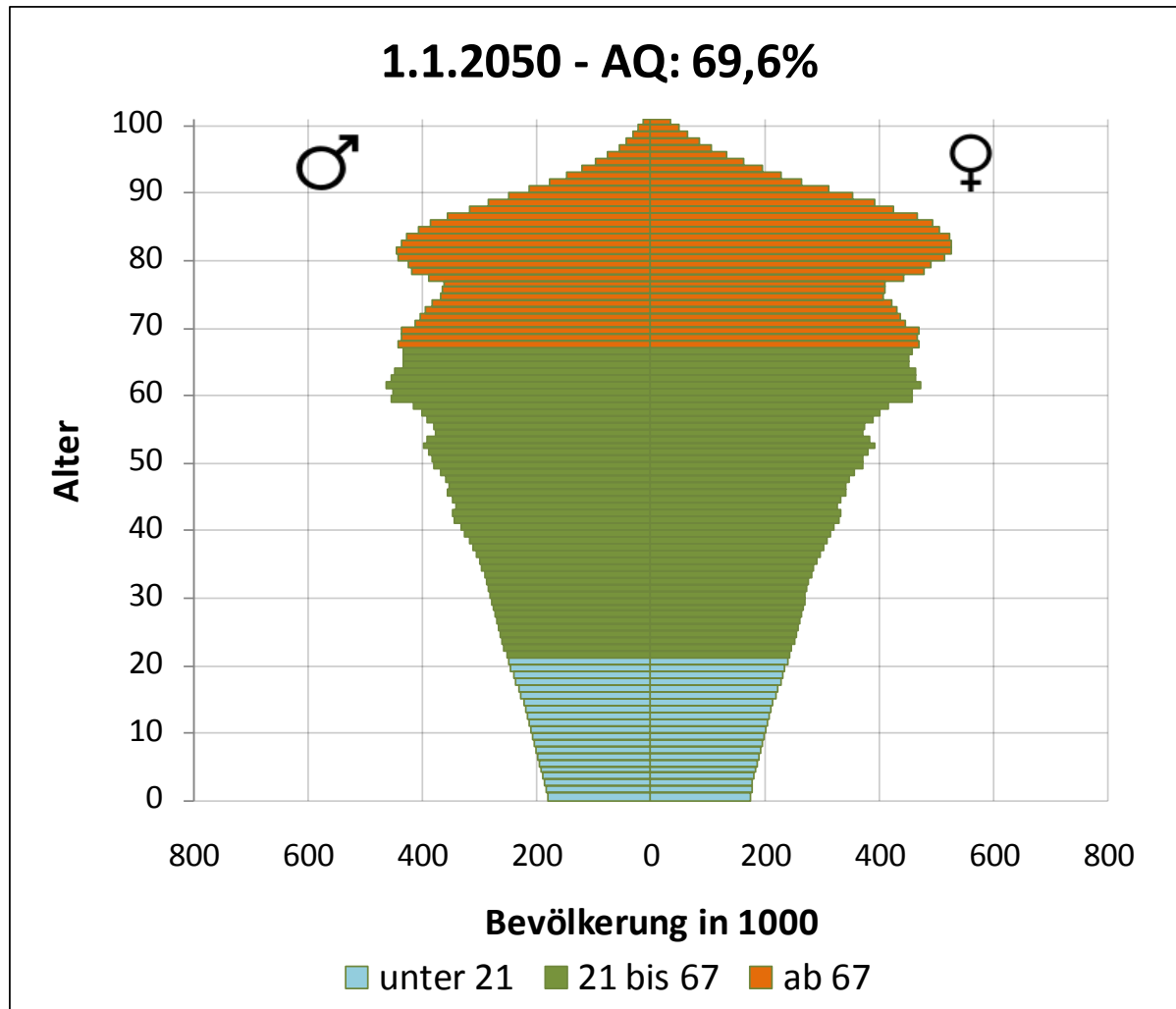




Altersquotient - 2010







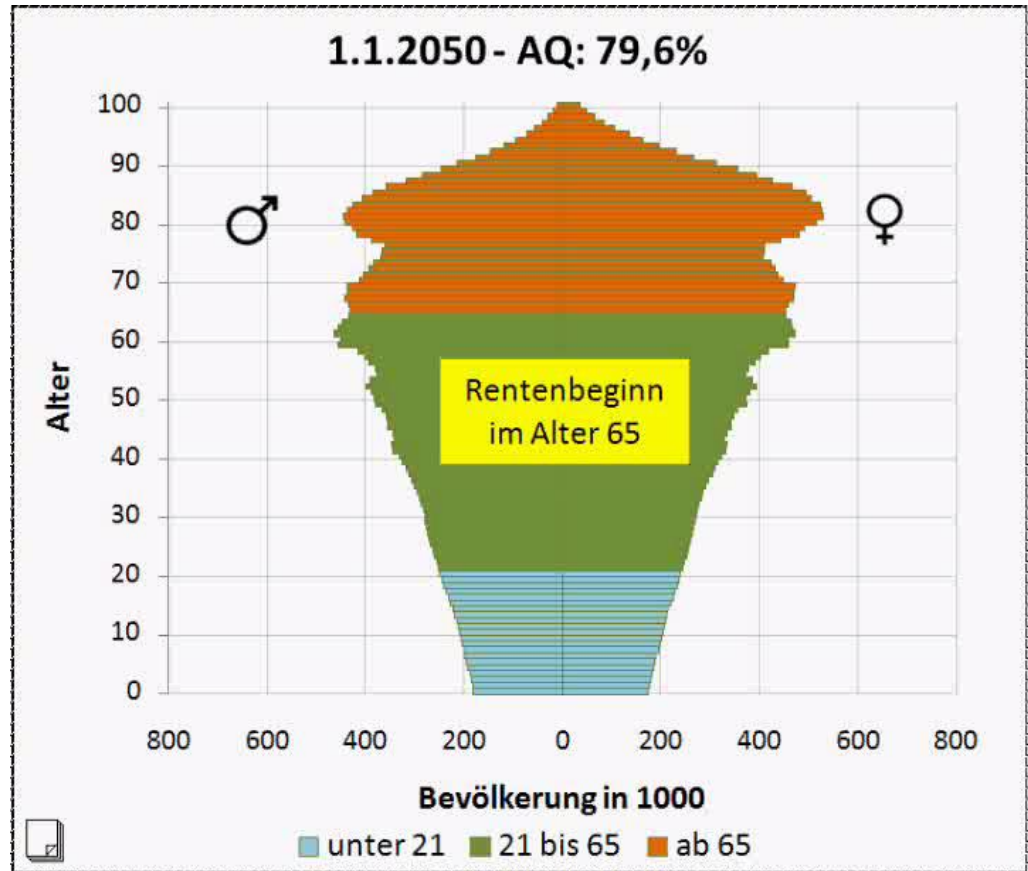
Szenario

- Szenario I
höheres Renteneintrittsalter
- Szenario II
keine Abtreibungen
- Szenario III
mehr Geburten
- Szenario IV
mehr Immigranten
- Szenario V
weniger Rentner



Szenario

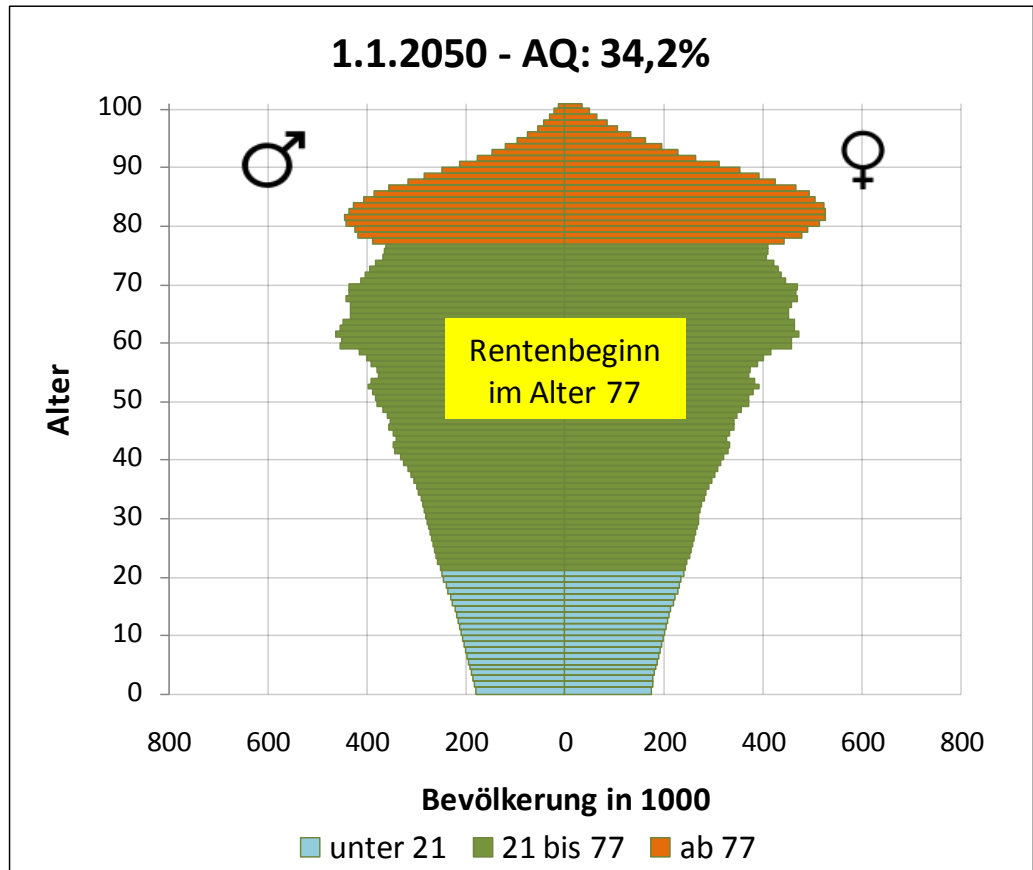
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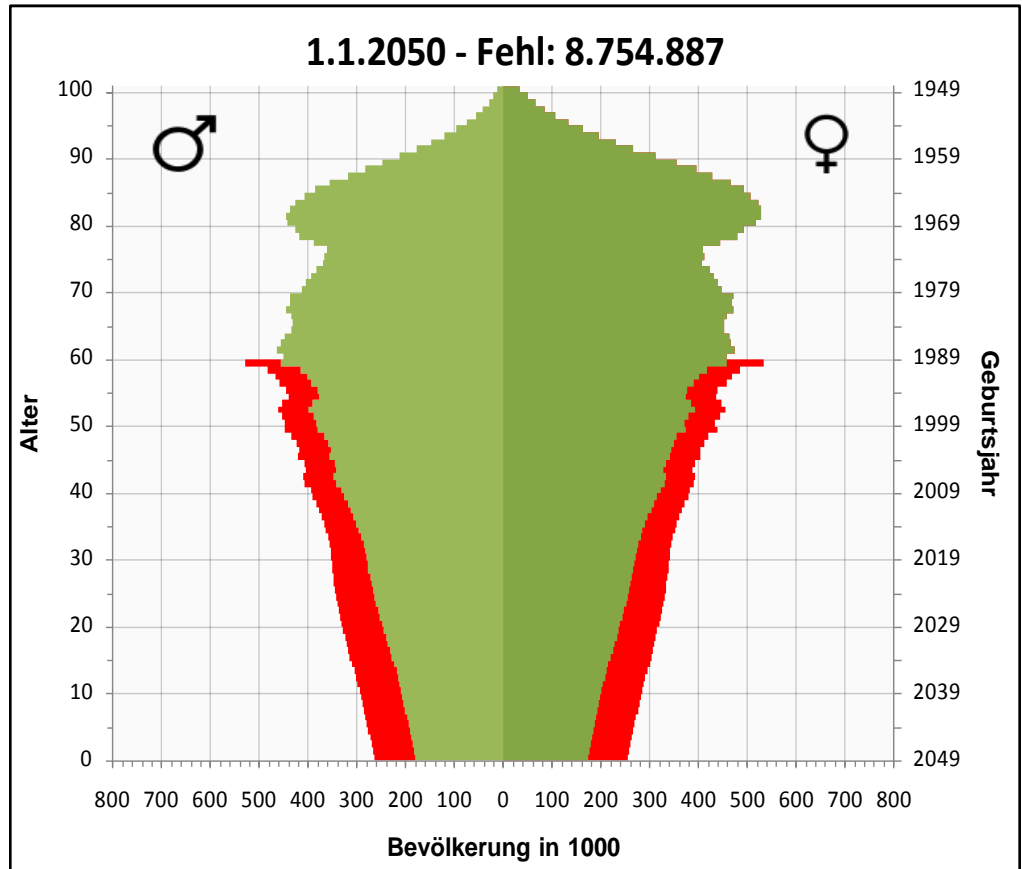
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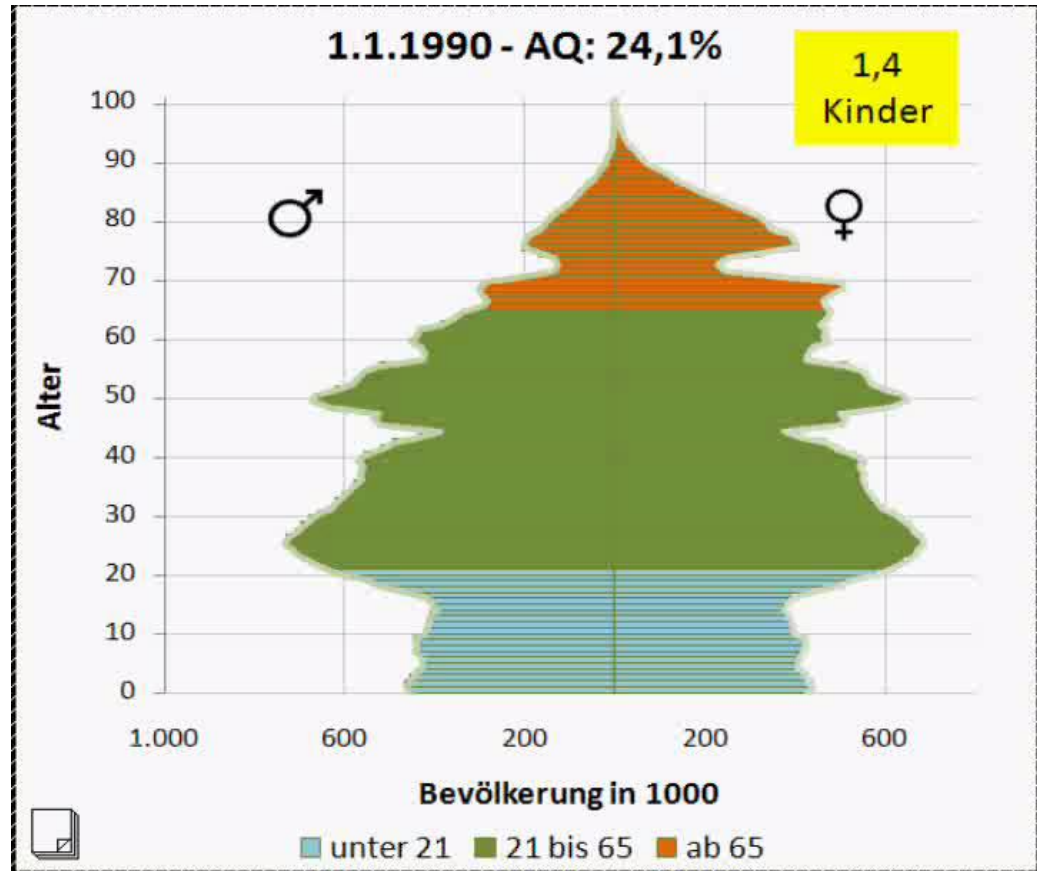
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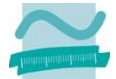
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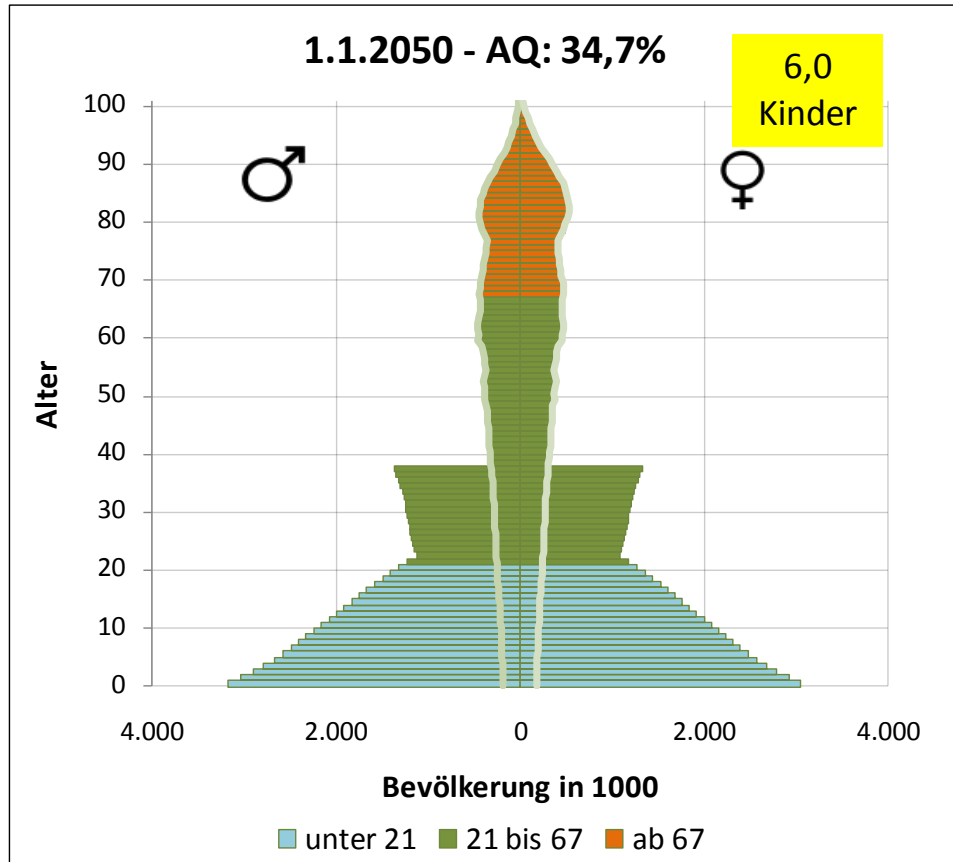
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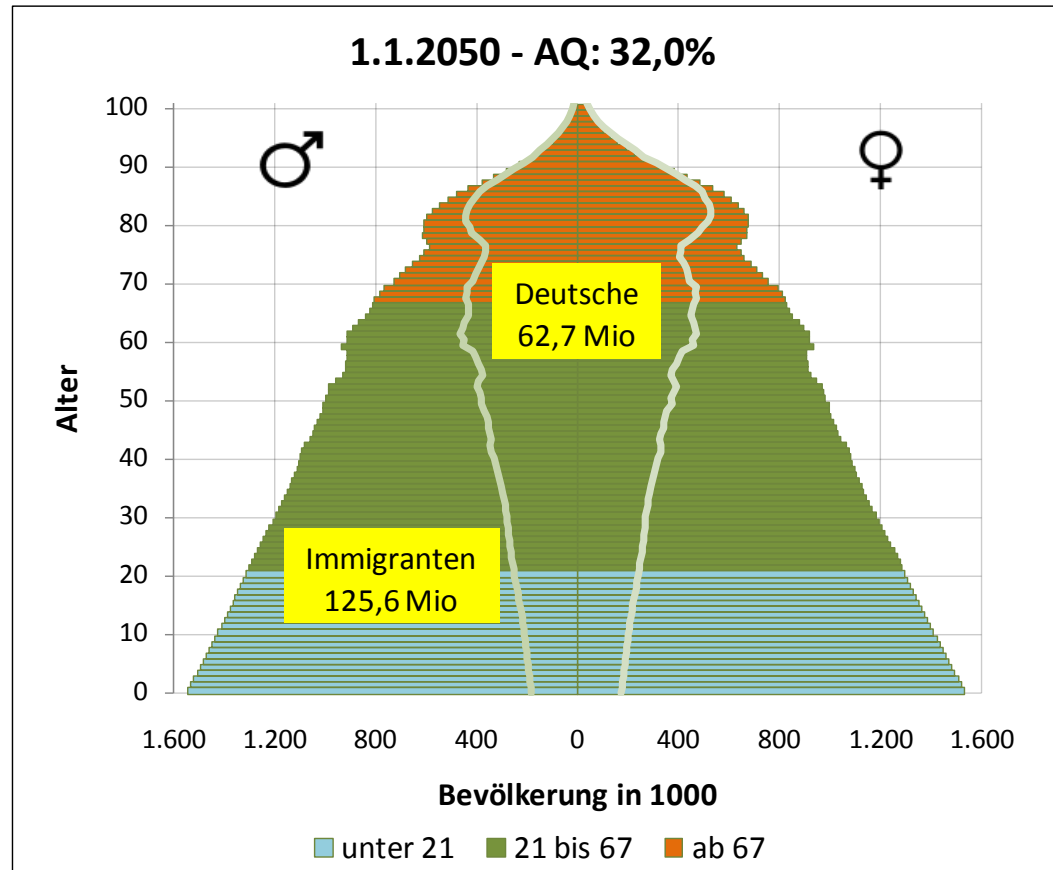
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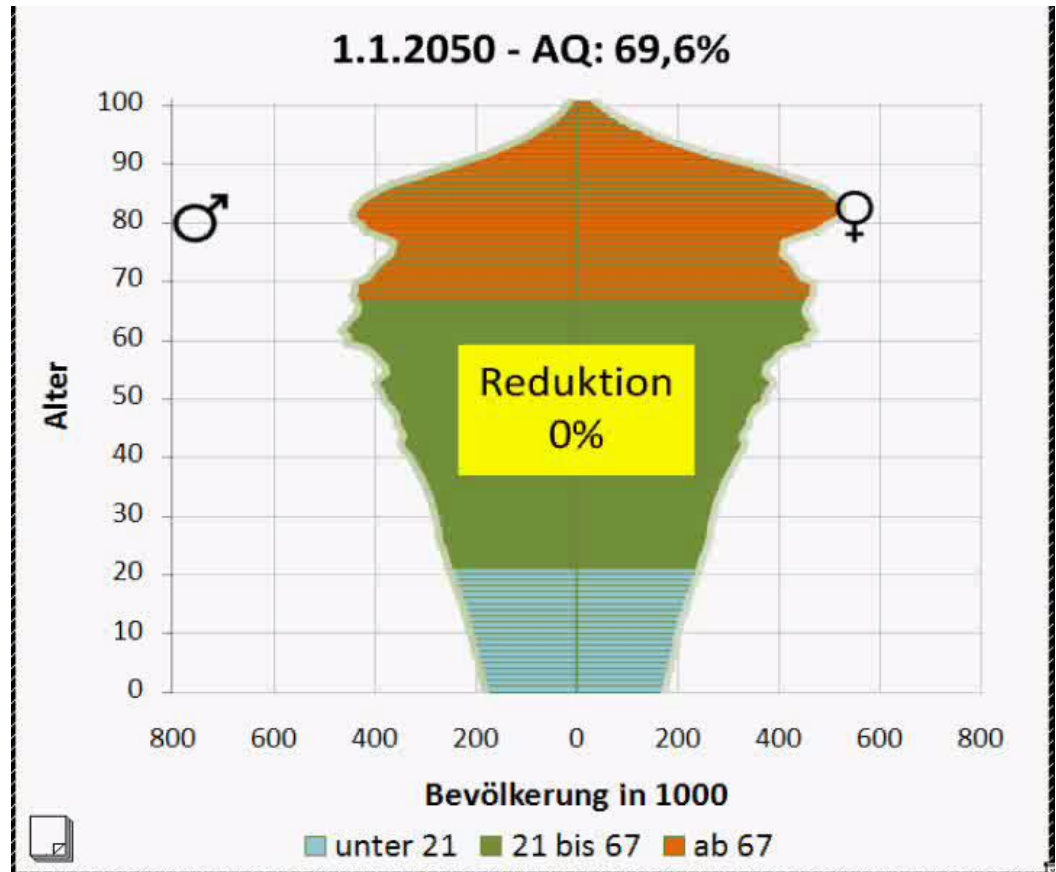
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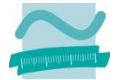
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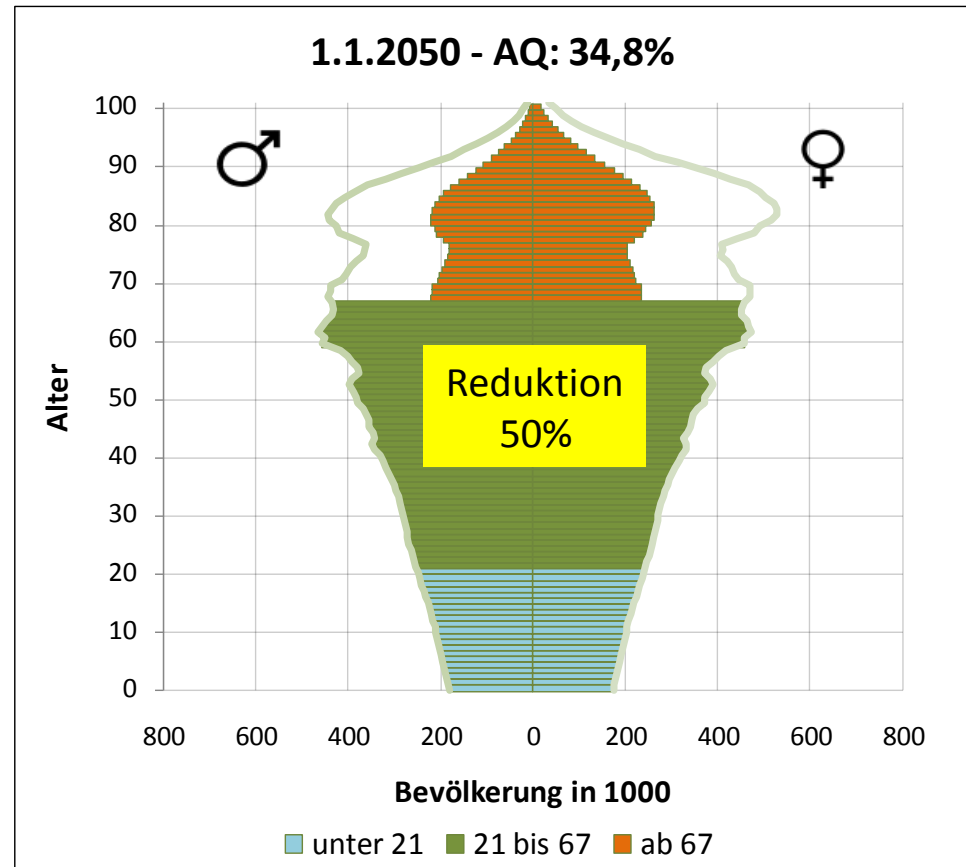
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Fazit

- Keines dieser Szenarien ist eine realistische Lösung des demographischen Problems.
- Folglich wird der Sozialstaat, so wie wir ihn kennen, nicht mehr lange funktionieren.
- Bedarf es eines Paradigmenwechsels?
- Inwiefern ist die Versicherungsbranche betroffen und beteiligt?

Diskussion

