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Projections des dépenses de santé dans les pays de l'OCDE

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Sommaire

Élaborer des perspectives d'évolution des dépenses de santé : un enjeu important pour la soutenabilité des finances publiques

Les projections à moyen et long termes des dépenses publiques, notamment des dépenses de santé, jouent un rôle important dans la conduite des politiques publiques mais également dans la surveillance budgétaire internationale. Élaborer des perspectives d'évolution des dépenses de santé à long terme constitue donc un enjeu important afin de définir les mesures nécessaires pour assurer la soutenabilité des finances publiques. Plusieurs facteurs interfèrent sur les dépenses de santé : le niveau de vie et le vieillissement des populations, l'évolution de la morbidité, les innovations technologiques, les prix de la santé ainsi que les facteurs institutionnels imputables au fonctionnement des systèmes de soins.

Après une présentation des modèles de projection des dépenses de santé en usage dans les pays de l'OCDE, cette bibliographie recense les principales études portant principalement sur les modèles macroéconomiques pour la période s'étendant de 2008 à mars 2020. Quelques publications antérieures à la crise économique de 2008 sont néanmoins signalées pour leur méthodologie, ainsi que des études relatives à l'impact du vieillissement sur les dépenses de santé.

Les recherches bibliographiques ont été réalisées sur les bases suivantes : Base bibliographique de l'Irdes, Banque de données santé publique (BDSP), Medline et Econlit. Les références bibliographiques sont présentées par année, puis par auteur.

Les modèles de projection de dépenses de santé

L'analyse de la littérature des projections des dépenses de santé permet d'identifier trois catégories de modèles de projection: les modèles de microsimulation, les modèles macro-économiques et les modèles de cohortes. [1]

Les modèles de microsimulation

Ils consistent à simuler des trajectoires de vie au niveau micro-écconomique, c'est-à-dire de l'individu. Ces modèles sont particulièrement adaptés aux études relatives aux politiques de

[1] Astolfi, R., et al. (2012

prévention concernant la prévalence de certaines pathologies, le financement des soins ou l'évolution de certaines variables liées au statut dans l'emploi.

On distingue quatre modèles à ce jour :

- The Future Elderly Model (The Rand – USA)
  http://www.rand.org/pubs/research_briefs/RB9324/index1.html

- The Population Health Model (Public Agency of Canada)
  http://www.phac-aspc.gc.ca/ph-sp/approach-approche/appr-eng.php
  https://pophealthmetrics.biomedcentral.com/articles/10.1186/s12963-015-0057-x

- The Swedish Microsimulation Model (Swedish Ministry of Finance)
  http://www.sesim.org/What.htm

- The National Heart Forum Microsimulation Model (NHS - Royaume-Uni)
  http://www.oecd-ilibrary.org/docserver/download/5k912j389bf0.pdf?expires=1476440572&id=id&accname=guest&checksum=B1EAFF78582F271460ABCA7F1705A05B

Les modèles macroéconomiques

Ils s'attachent à prévoir l'évolution des dépenses totales de santé en fonction de l'évolution des différents indicateurs macroéconomiques reflétant les perspectives démographiques d'un pays et/ou de sa richesse nationale. Ces études reposent sur une analyse rétrospective préalable des évolutions des dépenses de santé en fonction de différents paramètres mobilisables (progrès technologiques, facteurs institutionnels…). Elles reposent soit sur des séries temporelles relatives à un pays, soit sur des données de panel concernant différents pays. Les deux études les plus fiables sont celles de Dormont[2] et Oliviera Martins et al.[3] Elles modélisent les évolutions des dépenses de santé en prenant en compte le vieillissement de la population, l'évolution de la richesse nationale et le progrès technique.

Le modèle de cohortes

Ce modèle est le plus fréquemment utilisé dans le cadre des exercices nationaux et internationaux de projection financière (OCDE, Commission européenne, France). Il consiste à prévoir la croissance des dépenses de santé à partir de l'évolution des dépenses des différents sous-groupes de la population définis par exemple selon l'âge, le sexe et l'état de santé. La direction générale du Trésor a développé dans le cadre de l'exercice de projection mené par le Haut Conseil de l'avenir de l'assurance maladie (HCAAM) un modèle de cohorte spécifique à la France afin d'alimenter l'exercice de projection financière du Haut Conseil du financement de la protection sociale (HCFi-Ps).[4]

[2] Dormont, B., et al. (2008
[3] De, Lamaisonneuve, C. et Oliveira, M., J. (2013)
[4] Geay, C. et De, L.agasnerie, G. (2013)

Études françaises

Projection des dépenses de santé en France

L'étude réalisée par France stratégie en 2017[5] souligne une évolution modérée des dépenses de santé. Elle s'appuie sur trois modèles.

Les **projections de l'Ageing Working Group** de la Commission européenne[6] qui reposent sur trois piliers : i) des projections de population, qui fournissent des effectifs par âge et sexe entre 2010 et 2060 ; ii) des projections de PIB ; iii) un profil par âge et par sexe de dépenses publiques de santé par tête. Ces profils de dépenses évoluent dans le temps en fonction d'hypothèses relatives à trois facteurs : l'état de santé de la population à âge donné ; les coûts unitaires de santé ; l'élasticité de la demande de santé au revenu.

En 2013, la direction générale du trésor[7] a réalisé ses propres projections à la demande du Haut conseil pour l'avenir de l'assurance maladie. Elles s'appuient sur un modèle de macrosimulation par cohorte (PROMEDE), proche de celui utilisé par la Commission. Ce modèle offre néanmoins la particularité de distinguer les individus selon leur état de santé (souffrir ou non d'une affection de longue durée), là où les travaux de la Commission se contentaient de profils de dépenses moyennes par âge et sexe.

Le FMI[8] et l'OCDE[9] ont également proposé leurs projections de dépenses de santé, qui reposent sur une méthodologie un peu différente puisqu'elles introduisent un terme de croissance résiduel des dépenses de santé (« excess cost growth ») propre à chaque pays. Les dépenses de santé rapportées au PIB sont projetées en tenant compte d'abord des évolutions démographiques, puis de l'évolution de l'état de santé de la population et enfin en faisant une hypothèse sur ce terme de croissance résiduelle.

Les résultats de ces différentes projections, pour leur scénario central, sont reproduits dans le tableau en ligne sur le site de France stratégie.

2017

Cornilleau, G., Cicolella, A., Gayet, B., et al. (2017). "Santé 2050." Seve : Les Tribunes De La Sante(54): 21-59.
https://www.cairn.info/revue-les-tribunes-de-la-sante-2017-1.htm

> Ce numéro s'essaie à la prospective en s'interrogeant sur ce que sera dans notre système de santé dans plus de 30 ans dans des perspectives économiques, sociales, politiques et médicales. Il reprend les interventions du cycle 2016 du séminaire de la chaire santé intitulé Santé 2050.

Cusset, P. Y. (2017). Les déterminants de long terme des dépenses de santé en France. Document de travail ; 2017-07. Paris France Stratégie**:** 68 , tab., graph., fig.
http://www.strategie.gouv.fr/document-de-travail/determinants-de-long-terme-depenses-de-sante-france

[5] Cusset, P. Y. (2017). Les déterminants de long terme des dépenses de santé en France. Document de travail ; 2017-07
[6] Communauté Européenne (2018). The 2018 Ageing Report. Economic and Budgetary Projections for the 28 EU Member States (2016-2070). European Economy Institutional Papers; 079.
[7] Geay, C., Koubi, M. et De Lagasgnerie, G. (2015). Projections des dépenses de soins de ville, construction d'un module pour Destinie. G2015/15. Paris Insee.
[8] FMI (2010), Macro-Fiscal Implications of Health Care Reform in Advanced and Emerging Economies.
[9] de la Maisonneuve, C. et Martins, J. O. (2013). A Projection Method for Public Health and Long-Term Care Expenditures, OECD Publishing, OECD Economics Department Working Papers: 104.

Depuis les années 1950, la France consacre une part croissante de ses ressources aux dépenses de soins. Ainsi, la consommation de soins et biens médicaux (CSBM)[1] est passée de 2,6 à 8,9 points de PIB entre 1950 et 2015. La croissance des dépenses a été très forte en début de période, au moment où se constituait l'infrastructure sanitaire et se développait l'assurance maladie. Elle est plus faible depuis la fin des années 1980. Par ailleurs, depuis les années 1970, on assiste à un mouvement de convergence des niveaux de dépenses de santé parmi les pays les plus développés, les États-Unis faisant toutefois figure d'exception. Le document de travail rappelle d'abord quels sont les grands facteurs de croissance des dépenses de santé, en s'appuyant sur une somme de travaux réalisés sur cette question. Il discute ensuite les principales projections de long terme des dépenses de santé réalisées pour la France, en présentant leur méthodologie, leurs résultats et leurs limites.

Math, A. (2017). "L'impact des conditions macroéconomiques sur l'état de santé." Revue De L'ires(91-92): 49-75, tab.
http://www.ires.fr/index.php/publications-de-l-ires/itemlist/category/287-n-91-92

La réponse principale à la violente crise économique commencée en 2007 a été la mise en place et le renforcement de politiques de rigueur dans de nombreux pays. Or, les difficultés économiques marquent les corps et les vies de celles et ceux qui en souffrent. Dans ce contexte, mener une politique d'austérité ou de relance peut avoir des effets différenciés sur la santé de la population. Cet article a pour objectif de proposer un état de l'art sur la relation ambiguë entre conditions macroéconomiques et santé – est-ce la crise économique ou l'austérité qui détériore l'état de santé ? Si les travaux des économistes ont tendance à montrer que la crise économique est bonne pour la santé, une littérature plus récente issue de l'épidémiologie démontre qu'en cas de fluctuation économique la réponse politique est déterminante : quand la relance peut sauver des vies, l'austérité tue.

Roussel, R. (2017). "Personnes âgées dépendantes : les dépenses de prise en charge pourraient doubler en part de PIB d'ici à 2060." Etudes Et Resultats (Drees)(1032): 6.
http://drees.solidarites-sante.gouv.fr/etudes-et-statistiques/publications/etudes-et-resultats/article/personnes-agees-dependantes-les-depenses-de-prise-en-charge-pourraient-doubler

[BDSP. Notice produite par MIN-SANTE AHIlDR0x. Diffusion soumise à autorisation]. Tous financeurs confondus, les dépenses de prise en charge des personnes âgées dépendantes représentent 30,0 milliards d'euros en 2014, soit 1,40 point de PIB. Plus des trois quarts de ce montant (23,7 milliards d'euros, soit 1,11 point de PIB) sont financés par les pouvoirs publics. Évaluée dans une optique de surcoût de la dépendance, cette somme recouvre les dépenses de santé, de prise en charge de la perte d'autonomie et d'hébergement.

2015

Caby, D. et Eidelman, A. (2015). "Quel avenir pour le dispositif de prise en charge des affections de longue durée (ALD) ?" Lettre Tresor Eco(145): 8 , tabl., fig.

Face aux coûts que représente le dispositif de prise en charge des affections de longue durée, cette étude propose une réforme systémique de ce système en régulant la dépense publique et le reste à charge à partir de paramètres à définir (montant du plafond de reste à charge, niveau d'une éventuelle franchise, valeurs des tickets modérateurs...).Selon les auteurs, la prise en charge de la dépense de santé par l'assurance maladie obligatoire à partir de critères économiques rétablirait ainsi l'équité entre les malades, indépendamment de leur

pathologie, tout en leur évitant des restes à charges trop élevés.

Geay, C., et al. (2015). "Intégrer les dépenses de santé dans un modèle de microsimulation dynamique : le cas des dépenses de soins de ville." Economie Et Statistique(481-482): 211-234.

Anticiper la croissance à long terme des dépenses de santé constitue un des volets des exercices de surveillance budgétaire qui sont régulièrement menés à différents niveaux, notamment dans le cadre européen. Cette projection peut se faire à l'aide de maquettes macroéconomiques raisonnant à un niveau très agrégé. Mais l'exercice peut aussi se faire par micro-simulation, ce qui offre un plus grand potentiel en termes de variantes et de types de résultats. La contrepartie est évidemment une certaine complexité puisqu'il faut modéliser des trajectoires individuelles d'état de santé et la distribution des dépenses associées plutôt que des valeurs moyennes. Cet article présente les premières étapes de la construction d'un modèle de ce type, appliqué aux dépenses de soins de ville. Ce modèle comprend deux modules. Le premier est un module « épidémiologique » qui projette un indicateur dichotomique de bonne/mauvaise santé obtenu en croisant données de santé subjectives et objectives. Cet indicateur est évalué sur le panel de l'enquête santé et protection sociale (ESPS) allant de 2002 à 2008. Ce panel permet d'estimer les probabilités de passage entre bonne et mauvaise santé ainsi que les probabilités de décès différenciées selon l'état de santé. Ce sont ces probabilités qui sont ensuite utilisées pour faire vieillir progressivement l'échantillon de 2008, à l'horizon de 2032. Une fois projetés les états de santé individuels, le second module simule les dépenses qui leur sont associées, à l'aide d'une approche séquentielle simulant d'abord le fait d'avoir une dépense non nulle, puis le niveau de cette dépense si elle est positive. L'articulation de ces deux modules est illustrée par quelques projections exploratoires. Ils ont été conçus pour être applicables à d'autres données de base. Ils pourront aussi être couplés avec des outils de microsimulation appliqués aux autres aspects du vieillissement démographique, principalement les retraites (résumé d'auteur).

Geay, C., et al. (2015). Projections des dépenses de soins de ville, construction d'un module pour Destinie. G2015/15. Paris INSEE**:** 43, tabl., fig.
http://www.insee.fr/fr/themes/document.asp?reg_id=0&ref_id=G201515

Le poids de la couverture du risque maladie, qui représentait 3,4 % du PIB en 1960, a presque atteint 12 % du PIB en 2011, soit un poids comparable à celui des dépenses de retraites. Dans ce contexte, l'évolution des dépenses de santé constitue un enjeu important pour les économies en voie de vieillissement et qui font face à des contraintes accrues sur les finances publiques. Cette étude propose une première modélisation de la projection de ces dépenses (soins ambulatoires et biens médicaux) sur une base micro-économique. Un tel modèle permet de compléter les analyses macro-économiques en anticipant les évolutions des dépenses de santé en fonction des changements sociodémographiques en France à l'horizon 2060 et, ainsi, d'éclairer des arbitrages importants en termes de politiques publiques. L'accroissement de la dépense de soins de ville à l'horizon 2060 est sensible aux hypothèses retenues sur le partage de l'espérance de vie. Les écarts de durée de vie passée en bonne santé après 60 ans sont plus importants selon les niveaux d'études qu'entre hommes et femmes. Après 60 ans, les femmes et, surtout, les catégories plus diplômées, passent plus d'années en mauvaise santé que les autres.

2014

Geay, C., et al. (2014). Evolution of outpatient healthcare expenditure due to ageing in 2030 : a

dynamic micro-simulation model for France. LIEPP Working Papers ; 28. Paris SciencesPo - LIEPP**:** 45, tabl., graph.
http://spire.sciencespo.fr/hdl:/2441/5cg3fnvgpv8u5peaglp6lrkkaq/resources/wp-28-lagasnerie-complet.pdf

Population ageing will be a major challenge in Europe in the coming decades. This phenomenon will raise the question of the sustainability of public spending with increasing healthcare provision costs. This paper presents a dynamic micro-simulation model for outpatient healthcare expenditure in France, which projects healthcare costs in the long run. Like all the dynamic micro-simulation models, the model projects the population structure over time. The projections are run using a transition process between three states: two non-absorbing (good-health or ill-health) and one absorbing state (death). The outpatient healthcare expenditure is estimated on data between 2002 and 2008 through a two-part model. While healthcare spending of 25 years old and more represent 3.9% of GDP in 2008, they would reach 4.6% in the baseline scenario in 2032 (+0.7 percentage point of GDP or +17.5%). A difference in the share of expenditure in GDP appears between scenarios with different evolutions of health status during the projection period. Outpatient healthcare spending represents 4.6% of GDP in the central scenario in 2032, against 4.4 % in the most optimistic scenario and 4.7% in a pessimistic scenario.

2013

Geay, C. et De, Lagasnerie, G. (2013). Projections des dépenses de santé à l'horizon des dépenses de santé à l'horizon 2060, le modèle PROMEDE. G2015/15. Paris Direction Générale du Trésor**:** 41, tabl., fig.

Les projections à moyen et long terme des dépenses publiques, notamment des dépenses de santé, jouent un rôle important dans la conduite des politiques publiques mais également dans la surveillance budgétaire internationale. Dans ce contexte, la DG Trésor a été saisie par le Haut Conseil pour l'Avenir de l'Assurance Maladie (HCAAM) dans le cadre des

2012

Dormont, B., et al. (2012). Ageing, health and productivity : the economics of increased life expectancy, Oxford : Oxford University Press

Increase in life expectancy is arguably the most remarkable by-product of modern economic growth. In the last 30 years we have gained roughly 2.5 years of longevity every decade, both in Europe and the United States. Successfully managing aging and longevity over the next twenty years is one of the major structural challenges faced by policy makers in advanced economies, particularly in health spending, social security administration, and labor market institutions. This book looks closely into those challenges and identifies the fundamental issues at both the macroeconomic and microeconomic level. The first half of the book studies the macroeconomic relationships between health spending, technological progress in medical related sectors, economic growth, and welfare state reforms. In the popular press, longevity and population ageing are typically perceived as a tremendous burden. However, with a proper set of reforms, advanced economies have the option of transforming the enormous challenge posed by longevity into a long term opportunity to boost aggregate outcomes. The basic prerequisite of a healthy ageing scenario is a substantial structural reform in social security and in labor market institutions. The second part of the book looks

closely into the microeconomic relationship between population aging and productivity, both at the individual and at the firm level. There is surprisingly little research on such key questions. The book contributes to this debate in two ways. It presents a detailed analysis of the determinants of productivity, with a focus on both the long-run historical evolution and the cross sectional changes. It also uses econometric analysis to look into the determinants of the various dimensions of individual productivity. The volume concludes that the complex relationship between population ageing and longevity is not written in stone, and can be modified by properly designed choices (4e de couverture).

Dormont, B. et Huber, H. (2012). Vieillissement de la population et croissance des dépenses de santé. Paris Institut Montparnasse**:** 26 , fig.

Depuis le milieu du XXe siècle les économies développées connaissent deux grandes tendances : un formidable accroissement de la longévité et une augmentation continuelle de la part du produit intérieur brut consacrée aux dépenses de santé. Quel est le lien entre ces deux évolutions ? Contrairement à une opinion répandue, le vieillissement ne joue qu'un rôle mineur dans la croissance des dépenses de santé. Certes, chaque individu voit ses dépenses de santé augmenter lorsqu'il vieillit. Mais les changements les plus importants sont dus au fait que les dépenses individuelles de santé augmentent dans le temps, à âge et à maladie donnés. En 2009, par exemple, un homme de 50 ans affecté d'un diabète dépense beaucoup plus pour sa santé que le même quinquagénaire diabétique ne dépensait en 2000. Ce mouvement est sans rapport avec le vieillissement de la population. Il résulte principalement de la dynamique du progrès médical : de nouveaux produits et de nouvelles procédures apparaissent continuellement, qui induisent des changements dans les pratiques médicales. Une analyse de microsimulation réalisée sur des échantillons représentatifs des assurés sociaux français a permis de montrer que ces changements de pratiques influencent massivement la croissance des dépenses de santé, le vieillissement de la population ne jouant qu'un rôle mineur : sur la période 1992-2000, il n'explique pas plus d'un dixième de la croissance des dépenses de soins. Cette étude procède à une actualisation de cette étude sur la période 2000-2008. En reprenant les termes de l'analyse sur les deux périodes 1992- 2000 et 2000-2008, elle réalise des décompositions rétrospectives de l'impact des différents facteurs de la croissance des dépenses de santé. Ces décompositions sont obtenues grâce à l'estimation, sur des échantillons représentatifs des assurés français, de modèles de consommation de soins permettant de mettre en oeuvre des microsimulations.

2011

Thiebault, S. et Ventelou, B. (2011). "Evaluation de l'impact des changements épidémiologiques sur la dépense de santé en France pour 2025 : approche par microsimulation." Sciences Sociales Et Sante **29**(1): 35-67, graph, tabl., annexes.

Cet article propose une méthode de prédiction de l'évolution des dépenses de santé ambulatoire sous l'effet du vieillissement de la population française à l'horizon 2025. Le modèle intègre deux indicateurs d'état de santé sur lesquels chaque agent de la base de données pourra transiter, par microsimulation, créant ainsi une dynamique épidémiologique individuelle entre bonne et mauvaise santé. A l'aide d'un modèle économétrique de consommation de biens et de services de santé, les auteurs déduisent la dépense française en santé en 2025 par agrégation de la population représentative vieillie en 2025. Le support choisi pour la première application de l'outil est la base de données ESPS 2000 de l'Irdes appareillée avec l'échantillon permanent des assurés sociaux (EPAS). Le thème traité est l'impact de changements épidémiologiques sur le montant des dépenses ambulatoires. Ces

simulations ont été réalisées pour trois scénarios épidémiologiques : scénario à dynamique épidémiologique constante, vieillissement en bonne santé et vieillissement en bonne santé+ progrès médical (sans prise en compte des effets prix) (résumé de l'éditeur).

2010

Dormont, B., et al. (2010). Les dépenses de santé : une augmentation salutaire ? 16 nouvelles questions d'économie contemporaine., Paris : Albin Michel**:** 387-444.

Cette étude analyse les facteurs d'évolution des dépenses de santé depuis les années cinquante, pour la France et l'ensemble des pays industrialisés. Elle insiste plus particulièrement sur les facteurs "âge", proximité de la mort et diffusion des innovations médicales.

Elbaum, M. (2010). "L'évolution des dépenses de santé depuis vingt ans : quelques éléments d'analyse." Seve : Les Tribunes De La Sante: 15-29, fig., tabl.

L'augmentation des dépenses de santé s'est poursuivie au cours des vingt dernières années, avec une nette inflexion par rapport à la période précédente et sous la forme d'une montée par paliers. Les soins hospitaliers gardent une place prédominante, qui s'érode au profit des médicaments. La prise en charge publique s'est déplacée vers l'hôpital et les pathologies lourdes, les affections de longue durée concentrant plus de 62 % des remboursements du régime général. Les processus de régulation demeurent encore inaboutis : les tentatives de régulation financière ont eu des effets perceptibles mais mitigés, et les changements ont peu affecté le coeur du fonctionnement du système. D'importantes incertitudes sont liées au traitement futur des déficits et à la dynamique des dépenses à long terme : elles portent sur l'impact du vieillissement, mais encore plus sur les autres facteurs d'évolution. Une série de questions est alors posée pour le débat (résumé de l'éditeur).

2009

Albouy, V., et al. (2009). Les dépenses de santé en France : déterminants et impact du vieillissement à l'horizon 2050. Documents de travail de la DGTPE. 2009-11. Paris DGTPE**:** 33 , graph.

La part du revenu national consacrée à la santé est en forte croissance depuis plusieurs décennies. Cette dépense étant largement socialisée, il est capital d'évaluer si cette tendance a des chances de se poursuivre, quelles en sont les causes profondes, et si les politiques publiques peuvent l'infléchir. Ce document passe en revue les déterminants possibles de l'augmentation des dépenses de santé. Il conclut que si certains facteurs passés pourraient peser moins lourdement à l'avenir, la santé reste fondamentalement une industrie en croissance tirée par l'innovation technico-médicale. L'ampleur de la hausse à venir paraît néanmoins très incertaine : les estimations passées ici en revue anticipent une hausse du poids de la santé dans le PIB comprise entre 0 et plus de 10 points d'ici 2050. Dans une deuxième partie, une estimation originale de l'effet du vieillissement démographique est proposée. D?après nos estimations, l'impact du vieillissement sur la dépense de santé devrait être compris entre ½ et 2 ½ points de PIB d'ici 2050, selon que la santé des seniors ira spontanément en s'améliorant ou qu'au contraire les soins aux personnes âgées s'intensifient.

Barnay, T., et al. (2009). "L'effet du vieillissement et de l'évolution de la morbidité sur les dépenses

de médicaments remboursables en ville : une microsimulation quinquennale (2004-2029)." Economie Publique(24-25): 157-186.
https://economiepublique.revues.org/8487

Cet article propose une méthode de microsimulation, mise au point par l'Inserm SE4S à partir de la littérature médico-économique, de l'évolution des dépenses de médicaments remboursables (en médecine de ville) sous l'effet du vieillissement et de l'évolution de l'état de santé de la population française à l'horizon 2029. À partir de l'appariement de l'Enquête sur la santé et la protection sociale (ESPS) 2004 de l'Irdes et l'Échantillon permanent d'assurés sociaux (EPAS) sont construits 3 scenarii épidémiologiques. Sont ainsi obtenus pour les 25 ans et plus des taux de croissance annuels de dépenses en médicaments, imputables uniquement au vieillissement de la population et aux évolutions de l'état de santé, situés entre 1,14% et 1,77 %.

Cornilleau, G., et al. (2009). Quel sera le coût de la santé demain ? Traité d'économie et de gestion de la santé., Paris : Editions de Santé ; Paris : SciencesPo Les Presses: 153-162., tabl., graph., fig.

Dormont, B. (2009). Les dépenses de santé : une augmentation salutaire ? Paris Editions d'Ulm - Presses de l'Ecole normale supérieure: 78 , graph., fig.

Le débat sur le système de santé est d'ordinaire abordé sous l'angle du financement, avec la perspective des sacrifices à consentir. Une telle approche privilégie les moyens au dépend des fins. En s'intéressant de près à la dépense de santé, cette étude veut donner toute sa place aux objectifs. Depuis le milieu du XXe siècle les économies développées connaissent deux grandes tendances : un formidable accroissement de la longévité et une augmentation continuelle de la part du produit intérieur brut consacrée aux dépenses de santé. Quel est le lien entre ces deux évolutions ? Contrairement à une opinion répandue, le vieillissement ne joue qu'un rôle mineur dans la croissance des dépenses de santé. Celle-ci résulte principalement de la dynamique du progrès médical : de nouveaux produits et de nouvelles procédures apparaissent continuellement, dont la diffusion alimente la croissance des dépenses de santé. Ces dépenses sont-elles justifiées ? Doivent-elles continuer à progresser ? Ces questions doivent être posées car la dépense de santé est, dans une large proportion, financée par des prélèvements obligatoires. Pour y répondre, il faut mesurer la valeur des gains en santé et en longévité obtenus en contrepartie des dépenses de santé. On utilise pour cela le concept de « valeur statistique de la vie », employé dans d'autres domaines de la décision publique comme les politiques environnementales. Des études ciblées sur différentes pathologies comme les maladies cardiaques, la cataracte ou la dépression montrent que les innovations médicales ont, certes, entraîné une augmentation du coût des traitements. Mais la valeur de l'amélioration de la qualité de la vie, de la baisse des handicaps et de l'accroissement de la longévité qui en découlent dépasse largement la hausse du coût des soins. Une étude plus globale réalisée pour les États-Unis aboutit à une évaluation spectaculaire : entre 1970 et 2000, les progrès en santé et en longévité auraient représenté chaque année un gain égal à 34 % du PIB, soit plus du double des dépenses de santé, qui représentent 15 % du PIB dans ce pays. Un tel résultat suggère que dépenser encore plus pour la santé pourrait répondre aux préférences collectives. Grâce aux innovations médicales, nous vivons plus longtemps et en meilleure santé. Évalués en unités monétaires, les gains en bien-être obtenus en contrepartie de ces dépenses semblent gigantesques. Certes, des gains d'efficacité sont possibles et souhaitables. Mais il est urgent d'organiser en France un débat public sur le niveau désirable de l'effort consenti en faveur de la santé. La focalisation actuelle des discussions sur le niveau des prélèvements obligatoires escamote la réflexion sur les dépenses désirées..

Thiebaut, S. et Ventelou, B. (2009). "Impact du « healthy ageing » sur la dépense de santé pour 2025." Risques(80): 132-135.

Cette étude propose une prévision de l'évolution des dépenses de santé ambulatoires sous l'effet du vieillissement de la population française à l'horizon 2025, en déclinant les prévisions selon trois hypothèses : scénario tendanciel (maintien de l'incidence par classe d'âge des maladies chroniques) ; compression de la morbidité (healthy ageing) ; gain supplémentaire de longévité (progrès médical).

2008

Dormont, B., et al. (2008). Health Expenditures, longevity and growth. Working Paper Series. Rochester Social Science Electronic Publishing**:** 98 , tabl., fig.
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1130315

This paper offers an integrated view of the relationships between health spending, medical innovation, health status, growth and welfare. Health spending triggers technological progress, which is a potential source of better outcomes in terms of longevity and quality of life, a direct source of growth for the bio-tech industries and an indirect source of growth through improved of human capital. The latter contributes to GDP per capita through two main channels: higher participation of the population in the labour force and higher labour productivity levels. In turn, income growth induces an increase in health expenditure, as richer countries tend to spend a higher share of their income on health. To analyse these interactions, the paper first focuses on demographic facts, disentangling the role of longevity and carrying out some 'thought experiments' on the indexation of active life on longevity. It then analyses the links between health care expenditures, technology and health status from a micro-level perspective. We investigate empirically the relation between GDP growth and health expenditures and develop a projection method to assess the size of total aggregate expenditures that could be channeled to the health sector up to 2050 for the US, Europe and Japan. We finally assess the potential impact of these health expenditures and better health status on potential growth and productivity.

2007-2002

Raynaud, D., et al. (2007). "Perspectives à long terme des dépenses de santé en France." Rapport Du Conseil D'analyse Economique(72): 145-183, tab., graph., fig.
http://www.cae-eco.fr/Les-leviers-de-la-croissance-francaise.html

Cette annexe au rapport : "les leviers de la croissance" modélise l'évolution des dépenses de santé en France de 1970 à nos jours, et analyse les différents déterminants de cette évolution : vieillissement démographique, structure de l'emploi, offre de soins en ville et à l'hôpital, modes de rémunération des médecins, innovation technologique. La dernière partie de l'analyse porte sur les médicaments, perspectives en matière de prix et de remboursement, impact sur l'innovation.

Dormont, B., et al. (2006). "Health expenditures growth: reassessing the threat of aging." Health Economics **15**(9): 947-963, tabl.

In this paper, we evaluate the respective effects of demographic change, changes in morbidity and changes in practices on growth in health care expenditures. We use

microdata, i.e. representative samples of 3441 and 5003 French individuals observed in 1992 and 2000. Our data provide detailed information about morbidity and allow us to observe three components of expenditures: ambulatory care, pharmaceutical and hospital expenditures. We propose an original microsimulation method to identify the components of the drift observed between 1992 and 2000 in the health expenditure age profile. On the one hand, we find empirical evidence of health improvement at a given age: changes in morbidity induce a downward drift of the profile. On the other hand, the drift due to changes in practices is upward and sizeable. Detailed analysis attributes most of this drift to technological innovation. After applying our results at the macroeconomic level, we find that the rise in health care expenditures due to ageing is relatively small. The impact of changes in practices is 3.8 times larger. Furthermore, changes in morbidity induce savings which more than offset the increase in spending due to population ageing.

Dormont, B. et Huber, H. (2006). Causes of health expenditure growth: the predominance of changes in medical practices over population ageing. Cahiers de recherche EURISCO; 2006-03. Paris EURISCO**:** 39 , graph.
https://ideas.repec.org/a/adr/anecst/y2006i83-84p187-217.html

L'accroissement des dépenses de santé en France peut être expliqué par trois facteurs 1) l'effet démographique, 2) les changements au niveau de la morbidité à un âge donné et 3) les changements au niveau des pratiques, pour un âge donné et un niveau de morbidité. L'objectif de cet article est d?évaluer et d'interpréter les effets respectifs de ces trois facteurs.

Grignon, M. (2003). "Les conséquences du vieillissement de la population sur les dépenses de santé." Questions D'economie De La Sante (Credes)(66): 4 , 1 graph.
http://www.irdes.fr/Publications/Qes/Qes66.pdf

Le Conseil de Politique Économique de l'Union Européenne a lancé des travaux visant à analyser les conséquences du vieillissement sur les finances publiques des Etats membres. Dans ce cadre, cette étude confiée au CREDES par la Direction de la Prévision concerne plus particulièrement l'impact du vieillissement sur les dépenses publiques de santé. Pour mesurer cet impact en France à l'horizon 2020, l'auteur de ce document propose un scénario qui consiste à appliquer la dépense par âge constatée aujourd'hui à la pyramide des âges futurs. Ce travail se poursuivra par une seconde étape qui cherchera à mesurer l'évolution de la morbidité et de l'invalidité à âge donné. Les résultats présentés ici ont déjà fait l'objet d'un article paru en décembre 2002 dans la revue franco-québécoise "Santé, société et solidarité" ayant pour thème Vieillissement et Santé.

Grignon, M. (2002). "Impact macro-économique du vieillissement de la population sur les dépenses d'assurance maladie en France." Sante Societe Et Solidarite : Revue De L'observatoire Franco-Quebecois(2): 135-154.

Pour mesurer l'impact du vieillissement de la population sur les dépenses publiques de santé en France à l'horizon 2020, on propose un modèle dont le scénario central, dit "mécanique", consiste à appliquer la dépense par âge constatée aujourd'hui à la pyramide des âges future. Bien que simple dans son principe, ce scénario repose sur une modélisation du lien entre dépense et âge, les moyennes empiriques n'étant pas fiables. La première partie de l'article détaille cette modélisation où le scénario central conduit à une augmentation de 0,7 point de PIB de la dépense publique de soins sous le seul impact du vieillissement. Dans une deuxième partie, on critique ce même scénario central, notamment son hypothèse de stabilité de la dépense à âge donné. Le premier facteur susceptible de faire varier la dépense par âge est

évidemment l'état de santé : si, à âge donné, on est en meilleure santé, le scénario central surestime l'impact du vieillissement. Entre autres, le recul de l'âge au décès diminuerait la prévision du scénario central de 0,2 point de PIB.

Polton, D. et Sermet, C. (2006). "Le vieillissement de la population va-t-il submerger le système de santé ?" Bulletin Epidemiologique Hebdomadaire(5-6): 49-52, 42 fig., 41 tabl. http://www.invs.sante.fr/beh/2006/05_06/beh_05_06_2006.pdf

La question de l'impact du vieillissement de la population sur le coût des soins fait l'objet d'opinions contrastées. Selon certains, les évolutions démographiques des prochaines décennies seront insupportables pour les finances publiques et mettront inévitablement à mal le système d'assurance maladie. Pour d'autres au contraire, le vieillissement n'aura finalement qu'un impact limité et très supportable sur les dépenses de santé. Ce second point de vue est défendu par une bonne part de la communauté scientifique, tandis que les acteurs du système de santé et les media ont des anticipations plus sombres. Pour éclairer ce décalage des points de vue, cette revue de la littérature synthétise l'état actuel des connaissances et dégage les incertitudes, les points de débat et les questions encore en suspens que la recherche devra explorer (introduction).

Études internationales

2020

Keehan, S. P., Cuckler, G. A., Poisal, J. A., et al. (2020). "National Health Expenditure Projections, 2019-28: Expected Rebound In Prices Drives Rising Spending Growth." Health Aff (Millwood): 101377hlthaff202000094.

National health expenditures are projected to grow at an average annual rate of 5.4 percent for 2019-28 and to represent 19.7 percent of gross domestic product by the end of the period. Price growth for medical goods and services is projected to accelerate, averaging 2.4 percent per year for 2019-28, which partly reflects faster expected growth in health-sector wages. Among all major payers, Medicare is expected to experience the fastest spending growth (7.6 percent per year), largely as a result of having the highest projected enrollment growth. The insured share of the population is expected to fall from 90.6 percent in 2018 to 89.4 percent by 2028.

Waitzberg, R., Schmidt, A. E., Blümel, M., et al. (2020). "Mapping variability in allocation of Long-Term Care funds across payer agencies in OECD countries." Health Policy. http://www.sciencedirect.com/science/article/pii/S0168851020300488

Introduction Long-term care (LTC) is organized in a fragmented manner. Payer agencies (PA) receive LTC funds from the agency collecting funds, and commission services. Yet, distributional equity (DE) across PAs, a precondition to geographical equity of access to LTC, has received limited attention. We conceptualize that LTC systems promote DE when they are designed to set eligibility criteria nationally (vs. locally); and to distribute funds among PAs based on needs-formula (vs. past-budgets or government decisions). Objectives This cross-country study highlights to what extent different LTC systems are designed to promote DE across PAs, and the parameters used in allocation formulae. Methods Qualitative data were collected through a questionnaire filled by experts from 17 OECD countries. Results 11 out of 25 LTC systems analyzed, fully meet DE as we defined. 5 systems which give high autonomy to PAs have designs with low levels of DE; while nine systems partially promote

DE. Allocation formulae vary in their complexity as some systems use simple demographic parameters while others apply socio-economic status, disability, and LTC cost variations. Discussion and conclusions A minority of LTC systems fully meet DE, which is only one of the criteria in allocation of LTC resources. Some systems prefer local priority-setting and governance over DE. Countries that value DE should harmonize the eligibility criteria at the national level and allocate funds according to needs across regions.

2019

Breyer, F. et Lorenz, N. (2019). The "Red Herring" after 20 Years: Ageing and Health Care Expenditures. Cesifo Working Papers; 7951. Münich Cesifo**:** 23. http://d.repec.org/n?u=RePEc:ces:ceswps:_7951&r=age

20 years ago, Zweifel, Felder and Meier (1999) established the by now famous "red-herring" hypothesis, according to which population ageing does not lead to an increase in per capita health care expenditures (HCE) because the observed positive correlation between age and health care expenditures (HCE) in cross-sectional data is exclusively due to the facts that mortality rises with age and a large share of HCE is caused by proximity to death. This hypothesis has spurned a large and still growing literature on the causes and consequences of growing HCE in OECD countries, but the results of empirical studies have been rather mixed. In light of the imminent population ageing in many of these countries it is still being discussed whether unfunded social health insurance systems will be sustainable, in particular as long as they promise to provide universal and unlimited access to medical care including the latest advances. In this paper, we present a critical survey of the empirical literature of the past 20 years on this topic and draw some preliminary conclusions regarding the policy question mentioned above. In doing so we distinguish four different versions of the red herring hypothesis and derive the logical connections between them. This will help to understand what empirical findings are suitable to derive predictions on the future sustainability of HCE.

Casas, I., Gao, J., Peng, B., et al. (2019). Time-Varying Income Elasticities of Healthcare Expenditure for the OECD and Eurozone. Working Paper ; 28/19. Melbourne Monash University**:** 54. http://d.repec.org/n?u=RePEc:msh:ebswps:2019-28&r=hea

Income elasticity dynamics of health expenditure is considered for the OECD and Eurozone over the period 1995-2014. Motivated by some modelling challenges, this paper studies a class of non-linear cointegration panel data models, controlling for cross-section dependence and certain endogeneity. Using the corresponding methods, our empirical analyses show a slight increase in the income elasticity of the healthcare expenditure over the years, but still with values under 1, meaning that healthcare is not a luxury good in the OECD and Eurozone.

Lassila, J. et Valkonen, T. (2019). Alternative Demography-based Projection Approaches for Public Health and Long-term Care Expenditure. ETLA Working Papers No 74. Helsinki ETLA**:** 20 , fig., tabl. https://www.etla.fi/wp-content/uploads/ETLA-Working-Papers-74.pdf

Ageing populations pose a major challenge for long-term sustainability of public finances. The respond has been a wave of pension reforms that has lowered markedly the projected pension expenditure in EU countries. The increase in the second major expenditure item, health and long-term care costs, has become the most important element of fiscal sustainability gaps. We compare different demography-based approaches generally used to evaluate the costs. The interaction of different projection approaches and demography is

illustrated by using realizations of a stochastic population projection as inputs in a numerical expenditure model. Our example country is Finland. Our results show that considering the effects of proximity to death on the expenditure generates markedly slower expected expenditure growth for the health and long-term care costs than using age-specific costs or the method developed and used by the European Commission and the Finnish Ministry of Finance. In addition, the sensitivity of the expenditure projections to demographic risks is lower. The differences in the outcomes of the different approaches are largest in long-term care costs, which are in any case growing faster in Finland than the health care expenditure because on population ageing.

Lorenzoni, L., Marino, A., Morgan, D., et al. (2019). Health Spending Projections to 2030: New results based on a revised OECD methodology. OECD Health Working Papers; 110. Paris OCDE**:** 46. https://www.oecd-ilibrary.org/social-issues-migration-health/health-spending-projections-to-2030_5667f23d-en

To gain a better understanding of the financial sustainability of health systems, the OECD has produced a new set of health spending projections up to 2030 for all its member countries. Estimates are produced across a range of policy situations. Policy situations analysed include a "base" scenario – estimates of health spending growth in the absence of major policy changes – and a number of alternative scenarios that model the effect on health spending of policies that increase productivity or contribute to better lifestyles; or conversely, ineffective policies that contribute to additional cost pressures on health systems.

Sisko, A. M., Keehan, S. P., Poisal, J. A., et al. (2019). "National Health Expenditure Projections, 2018-27: Economic And Demographic Trends Drive Spending And Enrollment Growth." Health Aff (Millwood) **38**(3): 491-501.

National health expenditures are projected to grow at an average annual rate of 5.5 percent for 2018-27 and represent 19.4 percent of gross domestic product in 2027. Following a ten-year period largely influenced by the Great Recession and major health reform, national health spending growth during 2018-27 is expected to be driven primarily by long-observed demographic and economic factors fundamental to the health sector. Prices for health care goods and services are projected to grow 2.5 percent per year, on average, for 2018-27-faster than the average price growth experienced over the last decade-and to account for nearly half of projected personal health care spending growth. Among the major payers, average annual spending growth in Medicare (7.4 percent) is expected to exceed that in Medicaid (5.5 percent) and private health insurance (4.8 percent) over the projection period, mostly as a result of comparatively higher projected enrollment growth. The insured share of the population is expected to remain stable at around 90 percent throughout the period, as net gains in health coverage from all sources are projected to keep pace with population growth.

von Wyl, V. (2019). "Proximity to death and health care expenditure increase revisited: A 15-year panel analysis of elderly persons." Health Econ Rev **9**(1): 9.

BACKGROUND: Health care expenditures (HCE) are known to steepen with increasing age, but the contributions of biological age, morbidity, or proximity to death as cost drivers are debated. Age-associated HCE growth can be studied across two dimensions: within fixed groups of persons with the same birth year followed over time (birth cohort), or the same age classes (e.g. 66 to 70 year olds) at different time points (age-class analysis). Using health insurance claims data including morbidity and mortality information, HCE growth was analyzed in Swiss mandatory health insurance for the years 1996 to 2011 and compared

across the two age dimensions. RESULTS: Deflated HCE were analyzed for 104,000 persons from three birth cohorts (1921-25, 1926-30, 1931-35). Two-part regression models were adjusted for proximity-to-death (death within same or next calendar year) and morbidity indicators (hospitalization, high drug expenditures, and pharmaceutical cost groups from 2006 onwards). When analyzing HCE growth within birth cohorts, controlling for survival and morbidity status decreased age-associated HCE estimates by 31% to 51% compared to crude age averages. The total HCE volume share of decedents rose from 19% to 31% in the 1931-35 birth cohort and from 28% to 51% for the 1921-25 birth cohort. The analysis of same age classes (e.g. 71-75 year olds) over different years revealed no HCE growth (steepening) in excess of deflation for groups aged 75 years or less, and only moderate HCE growth for those >/=76 years. For the 76+ age classes, the population fraction of decedents decreased by -3% (age 76-80) and -15% (age 81-85) over time, whilst the total HCE volume share of decedent-associated HCE increased by +16% and +9%, with an HCE growth of +3.2% and +2.5% per year. CONCLUSIONS: HCE growth was dominated by end-of-life HCE, but residual age-associated HCE growth remained pertinent, the extent of which however depended on morbidity indicator definitions. A better understanding of shifts in chronic disease prevalence with rising age, as well as associated HCE and survival impacts of treatment will be key for further refining future HCE projections.

Williams, G., Cylus, J., Roubal, T., et al. (2019). Sustainable health financing with an ageing population: Will population ageing lead to uncontrolled health expenditure growth? The economics of healthy and active ageing series. Copenhague Office des publications du bureau régional de l'Europe**:** 19 , fig.
https://apps.who.int/iris/bitstream/handle/10665/329382/19978073-eng.pdf

In this brief, the authors use historical data on per person health spending by age group to develop a set of projections on health care spending growth through 2060 due to population ageing for a) countries that already have a large share of the population at older ages and b) countries with relatively younger populations that are undergoing rapid population ageing. Hypothetical scenarios are also explored in recognition that health spending by age patterns might vary in the future. These analyses find that population ageing is not, and will not become, a major driver of growth in health expenditures. Moreover, they suggest that in countries where age demographics are changing but the size of the older population is not yet large, the costs of improving coverage and access to services for older people is likely to be manageable and now is a good time to begin investing in the health system while the population is relatively young. However, while population ageing will not become a main driver of health expenditure growth, policy choices related to how health services are delivered, the prices paid (or negotiated) for services, medicines and technologies, and volumes of care will ultimately determine health spending by age trends. The authors conclude by considering policy options that can be implemented to target these factors, helping to limit future growth in health expenditures within a context of population ageing

Williams, G. A., Cylus, J., Roubal, T., et al. (2019). European Observatory Policy Briefs. Sustainable Health Financing with an Ageing Population: Will population ageing lead to uncontrolled health expenditure growth? Sagan, A., Normand, C., Figueras, J., North, J. etWhite, C. Copenhagen (Denmark), European Observatory on Health Systems and Policies

Per person health expenditures are generally higher among older people than younger people - particularly in developed health systems. As such, policy-makers often assume that population ageing will result in unconstrained growth in health spending. However, by applying data on public health expenditure patterns by age from European Union (EU) countries to population projections for both the EU and Japan, we find that health spending

growth attributable to population ageing will be marginal through 2060, adding less than 1 percentage point per year to per person annual growth. Applying the same public health expenditure by age data to population projections for Indonesia, we estimate the costs of "scaling-up" a health system to meet the care needs of an ageing population. We find that this too can be modest, especially if investments are made before a large share of the population is at older ages, and if scaling-up is spread out over time. In recognition that future expenditure patterns may vary due to a number of other factors that relate to changes in the age-mix, we develop a series of hypothetical scenarios where per person health expenditures are even higher for older people compared with their younger counterparts than the most recent EU health expenditure data suggest. However, even in the most "extreme" hypothetical scenario presented here, designed to be consistent with an increase in the volume, price, intensity and coverage of services for older people under the public health budget, population ageing only increases the overall EU health spending share of GDP in 2060 by 0.85 more percentage points than it would according to projections based on current expenditure by age patterns; 1.00 more percentage point for Japan; and 1.67 percentage points more for Indonesia, assuming that health spending is scaled-up to reach the EU average over 15 years. Taken together, these findings suggest that population ageing is not, and will not become, a major driver of growth in health expenditures. Policy choices still play an important role in determining the ways in which health spending trends will materialize. Such choices determine how health services are delivered, the prices paid for goods and services, and how coverage decisions are made. While ageing will not become the main driver of health expenditure growth, effective policy options can be implemented to moderate the growth in health expenditures as populations age.

2018

(2018). "Trends in future health financing and coverage: future health spending and universal health coverage in 188 countries, 2016-40." Lancet **391**(10132): 1783-1798.

BACKGROUND: Achieving universal health coverage (UHC) requires health financing systems that provide prepaid pooled resources for key health services without placing undue financial stress on households. Understanding current and future trajectories of health financing is vital for progress towards UHC. We used historical health financing data for 188 countries from 1995 to 2015 to estimate future scenarios of health spending and pooled health spending through to 2040. METHODS: We extracted historical data on gross domestic product (GDP) and health spending for 188 countries from 1995 to 2015, and projected annual GDP, development assistance for health, and government, out-of-pocket, and prepaid private health spending from 2015 through to 2040 as a reference scenario. These estimates were generated using an ensemble of models that varied key demographic and socioeconomic determinants. We generated better and worse alternative future scenarios based on the global distribution of historic health spending growth rates. Last, we used stochastic frontier analysis to investigate the association between pooled health resources and UHC index, a measure of a country's UHC service coverage. Finally, we estimated future UHC performance and the number of people covered under the three future scenarios. FINDINGS: In the reference scenario, global health spending was projected to increase from US$10 trillion (95% uncertainty interval 10 trillion to 10 trillion) in 2015 to $20 trillion (18 trillion to 22 trillion) in 2040. Per capita health spending was projected to increase fastest in upper-middle-income countries, at 4.2% (3.4-5.1) per year, followed by lower-middle-income countries (4.0%, 3.6-4.5) and low-income countries (2.2%, 1.7-2.8). Despite global growth, per capita health spending was projected to range from only $40 (24-65) to $413 (263-668) in 2040 in low-income countries, and from $140 (90-200) to $1699 (711-3423) in lower-

middle-income countries. Globally, the share of health spending covered by pooled resources would range widely, from 19.8% (10.3-38.6) in Nigeria to 97.9% (96.4-98.5) in Seychelles. Historical performance on the UHC index was significantly associated with pooled resources per capita. Across the alternative scenarios, we estimate UHC reaching between 5.1 billion (4.9 billion to 5.3 billion) and 5.6 billion (5.3 billion to 5.8 billion) lives in 2030. INTERPRETATION: We chart future scenarios for health spending and its relationship with UHC. Ensuring that all countries have sustainable pooled health resources is crucial to the achievement of UHC. FUNDING: The Bill & Melinda Gates Foundation.

Carreras, M., Ibern, P. et Inoriza, J. M. (2018). "Ageing and healthcare expenditures: Exploring the role of individual health status." Health Econ **27**(5): 865-876.

In 1999, Zweifel, Felder, and Meiers questioned conventional wisdom on ageing and healthcare expenditure (HCE). According to these authors, the positive association between age and HCE is due to an increasing age-specific mortality and the high cost of dying. After a weighty academic debate, a new consensus was reached on the importance of proximity to death when analysing HCE. Nevertheless, the influence of individual health status remains unknown. The objective of our study is to analyse the influence individual health status has on HCE, when compared to proximity to death and demographic effects and considering a comprehensive view of healthcare services and costs. We examined data concerning different HCE components of N = 61,473 persons aged 30 to 95 years old. Using 2-part models, we analysed the probability of use and positive HCE. Regardless of the specific group of healthcare services, HCE at the end of life depends mainly on the individual health status. Proximity to death approximates individual morbidity when it is excluded from the model. The inclusion of morbidity generally improves the goodness of fit. These results provide implications for the analysis of ageing population and its impact on HCE that should be taken into account.

Casas, I., Gao, J. et Xie, S. (2018). Modelling Time-Varying Income Elasticities of Health Care Expenditure for the OECD. Working Paper 22/18. Melbourne Monash University.

Income elasticity dynamics of health expenditure is considered for the OECD and the Eurozone over the period 1995-2014. This paper studies a novel non-linear cointegration model with fixed effects, controlling for cross-section dependence and unobserved heterogeneity. Most importantly, its coefficients can vary over time and its variables can be non-stationary. The resulting asymptotic theory is fundamentally different with a faster rate of convergence to similar kernel smoothing methodologies. A fully modified kernel regression method is also proposed to reduce the asymptotic bias. Results show a steep increase in the income elasticity for the OECD and a small increase for the Eurozone.

Communauté Européenne (2018). The 2018 Ageing Report. Economic and Budgetary Projections for the 28 EU Member States (2016-2070). European Economy Institutional Papers; 079. Luxembourg Publications Office of the European Union: xvi+383, tabl.
https://ec.europa.eu/info/publications/economy-finance/2018-ageing-report-economic-and-budgetary-projections-eu-member-states-2016-2070_en

This report looks at the long-run economic and fiscal implications of Europe's ageing population. This report is structured in two parts. The first part describes the underlying assumptions: the population projection, the labour force projection and the macroeconomic assumptions used. The second part presents the long-term budgetary projections on pensions, health care, long-term care, education and unemployment benefits. A Statistical

Annex gives an overview of the main assumptions and macroeconomic projections as well as projection results of age-related expenditure items by area and by country.

Cuckler, G. A., Sisko, A. M., Poisal, J. A., et al. (2018). "National Health Expenditure Projections, 2017-26: Despite Uncertainty, Fundamentals Primarily Drive Spending Growth." Health Aff (Millwood) **37**(3): 482-492.

Under current law, national health spending is projected to grow 5.5 percent annually on average in 2017-26 and to represent 19.7 percent of the economy in 2026. Projected national health spending and enrollment growth over the next decade is largely driven by fundamental economic and demographic factors: changes in projected income growth, increases in prices for medical goods and services, and enrollment shifts from private health insurance to Medicare that are related to the aging of the population. The recent enactment of tax legislation that eliminated the individual mandate is expected to result in only a small reduction to insurance coverage trends.

Einav, L., Finkelstein, A., Mullainathan, S., et al. (2018). "Predictive modeling of U.S. health care spending in late life." Science **360**(6396): 1462-1465.

That one-quarter of Medicare spending in the United States occurs in the last year of life is commonly interpreted as waste. But this interpretation presumes knowledge of who will die and when. Here we analyze how spending is distributed by predicted mortality, based on a machine-learning model of annual mortality risk built using Medicare claims. Death is highly unpredictable. Less than 5% of spending is accounted for by individuals with predicted mortality above 50%. The simple fact that we spend more on the sick-both on those who recover and those who die-accounts for 30 to 50% of the concentration of spending on the dead. Our results suggest that spending on the ex post dead does not necessarily mean that we spend on the ex ante "hopeless."

Hatfield, L. A., Favreault, M. M., McGuire, T. G., et al. (2018). "Modeling Health Care Spending Growth of Older Adults." Health Serv Res **53**(1): 138-155.

OBJECTIVE: To forecast out-of-pocket health care spending among older adults. Long-term forecasts allow policy makers to explore potential impacts of policy scenarios, but existing microsimulations do not incorporate details of supplemental insurance coverage and income effects on health care spending. DATA SOURCES: Dynamic microsimulation calibrated to survey and administrative data. STUDY DESIGN: We augment Urban Institute's Dynamic Simulation of Income Model (DYNASIM) with modules that incorporate demand responses and economic equilibria, with dynamics driven by exogenous technological change. A lengthy technical appendix provides details of the microsimulation model and economic assumptions for readers interested in applying these techniques. PRINCIPAL FINDINGS: The model projects total out-of-pocket spending (point of care plus premiums) as a share of income for adults aged 65 and older. People with lower incomes and poor health fare worse, despite protections of Medicaid. Spending rises 40 percent from 2012 to 2035 (from 10 to 14 percent of income) for the median beneficiary, but it increases from 5 to 25 percent of income for low-income beneficiaries and from 23 to 29 percent for the near poor who are in fair/poor health. CONCLUSIONS: Despite Medicare coverage, near-poor seniors will face out-of-pocket spending that would render them, in practical terms, underinsured.

Van Der Maaden, T., Bruijn, B. J. d., Vonk, R., et al. (2018). Horizon scan of medical technologies. Technologies with an expected impact on the organisation and expenditure of healthcare. Bilthoven RIVM**:** 81, tabl., fig., ann.

Medical technology is developing rapidly. Promising new technologies could offer benefits for the quality and organisation of healthcare. However, in practice innovations do not always fully match with medical and societal needs. Healthcare professionals, patients, health insurers, industry and the authorities all agree it is important to improve this. To achieve this, it is important that relevant stakeholders start to join forces already in early stages of development. This is a message from a 'horizon scan' of medical technologies performed by the RIVM at the request of the Dutch Ministry of Health, Welfare and Sports. The 'horizon scan' identifies technologies with a potentially major impact on the society. eHealth, robotics to support care for the elderly, and the 3D printing of for example implants or of organ models to be used for the preparation of surgery, may offer major potential benefits. These technologies are expected to affect the organisation and costs of care, either in a positive or negative sense. The precise impact of these technologies is difficult to predict. Other technologies may also have major impact. Nanotechnology, for example, is considered a technology that enables other innovative developments, such as early diagnosis and treatment of cancer; personalised medicine (customized care) as a development that is enabled by promising medical technologies. In addition, non-medical technologies such as 'big data' and artificial intelligence can have major impact on healthcare. Bringing together stakeholders is the first, important, step to better connect technological possibilities with medical and societal needs. This may provide direction to developers of technology. It can also help healthcare organisations to take full advantage of promising medical technology.

Yang, C., Delcher, C., Shenkman, E., et al. (2018). "Machine learning approaches for predicting high cost high need patient expenditures in health care." Biomed Eng Online **17**(Suppl 1): 131.

BACKGROUND: This paper studies the temporal consistency of health care expenditures in a large state Medicaid program. Predictive machine learning models were used to forecast the expenditures, especially for the high-cost, high-need (HCHN) patients. RESULTS: We systematically tests temporal correlation of patient-level health care expenditures in both the short and long terms. The results suggest that medical expenditures are significantly correlated over multiple periods. Our work demonstrates a prevalent and strong temporal correlation and shows promise for predicting future health care expenditures using machine learning. Temporal correlation is stronger in HCHN patients and their expenditures can be better predicted. Including more past periods is beneficial for better predictive performance. CONCLUSIONS: This study shows that there is significant temporal correlation in health care expenditures. Machine learning models can help to accurately forecast the expenditures. These results could advance the field toward precise preventive care to lower overall health care costs and deliver care more efficiently.

2017

Getzen, T. E. (2017). The Growth of Health Spending in the USA: 1776 to 2026. Philadelphie Temple University.

This review utilizes a number of historical and contemporary sources to trace the growth of national health expenditures in the United States from 1776 to 2026, supporting four empirical generalizations. Modern medical care in 2015 is still recognizably close in form to the 1970 version, much more so than medical practice in 1970 was to that in 1930 or 1945. Highly organized and regulated, with academic medical centers at the core, there is "almost" universal insurance coverage for more than 80% of the population that subsidizes a safety net for the remainder. This patchwork of public and private insurance has cracked and frayed

as the health share of GDP expanded toward 20% of GDP making the current system appear unsustainable and portending major revisions within the next twenty years. Issues regarding measurement of national health expenditures, market definition, temporal dynamics, and decomposition are discussed. Appendices provide information on data sources and modeling.

Hartwig, J. et Sturm, J. E. (2017). Testing the Grossman model of medical spending determinants with macroeconomic panel data. KOF Working Papers; 426. Zurich Swiss Federal Institute of Technology**:** 30 , tabl.

Michael Grossman's human capital model of the demand for health has been argued to be one of the major achievements in theoretical health economics. Attempts to test this model empirically have been sparse, however, and with mixed results. These attempts so far relied on using – mostly cross-sectional – micro data from household surveys. For the first time in the literature we bring in macroeconomic panel data for 29 OECD countries over the period 1970-2010 to test the model. In order to check the robustness of the results for the determinants of medical spending identified by the model, we include additional covariates that have been suggested as determinants for medical spending in an Extreme Bounds Analysis (EBA) framework. The preferred model specifications (including the robust covariates) lend some support to the empirical relevance of the determinants of medical spending identified by the Grossman model, except for the relative medical price.

Keehan, S. P., Stone, D. A., Poisal, J. A., et al. (2017). "National Health Expenditure Projections, 2016-25: Price Increases, Aging Push Sector To 20 Percent Of Economy." Health Aff (Millwood) **36**(3): 553-563.

Under current law, national health expenditures are projected to grow at an average annual rate of 5.6 percent for 2016-25 and represent 19.9 percent of gross domestic product by 2025. For 2016, national health expenditure growth is anticipated to have slowed 1.1 percentage points to 4.8 percent, as a result of slower Medicaid and prescription drug spending growth. For the rest of the projection period, faster projected growth in medical prices is partly offset by slower projected growth in the use and intensity of medical goods and services, relative to that observed in 2014-16 associated with the Affordable Care Act coverage expansions. The insured share of the population is projected to increase from 90.9 percent in 2015 to 91.5 percent by 2025.

Marino, A., James, C. et Morgan, D. (2017). Future trends in health care expenditure. A modelling framework for cross-country forecasts. OECD Health Working Papers ; 96. Paris OCDE**:** 50 , tabl., fig. http://www.oecd-ilibrary.org/social-issues-migration-health/oecd-health-working-papers_18152015

Across the OECD, healthcare spending has typically outpaced economic growth in recent decades. While such spending has improved health outcomes, there are concerns about the financial sustainability of this upward trend, particularly as healthcare systems are predominantly funded from public resources in most OECD countries. To better explore this financial sustainability challenge, many countries and international institutions have developed forecasting models to project growth in future healthcare expenditure. Despite methodological differences between forecasting approaches, a common set of healthcare spending drivers can be identified. Demographic factors, rising incomes, technological progress, productivity in the healthcare sector compared to the general economy (Baumol's cost disease) and associated healthcare policies have all been shown to be key determinants of healthcare spending.

Moore, P. V., Bennett, K. et Normand, C. (2017). "Counting the time lived, the time left or illness? Age, proximity to death, morbidity and prescribing expenditures." Soc Sci Med **184**: 1-14.

> The objective is to understand what really drives prescription expenditure at the end of life in order to inform future expenditure projections and service planning. To achieve this objective an empirical analysis of public medication expenditure on the older population (individuals >/= 70 years of age) in Ireland (n = 231,780) was undertaken. A two part model is used to analysis the individual effects of age, proximity to death (PTD) and morbidity using individual patient-level data from administrative pharmacy records for 2006-2009 covering the population of community medication users. Decedents (n = 14,084) consistently use more medications and incur larger expenditures than similar survivors, especially in the last 6 months of life. The data show a positive and statistically significant impact of PTD on prescribing expenditures with minimal effect for age alone even accounting for patient morbidities. Nevertheless improved measures of morbidity are required to fully test the hypothesis that age and PTD are proxies for morbidity. The evidence presented refutes age as a driver of prescription expenditure and highlights the importance of accounting for mortality in future expenditure projections.

2016

(2016). "Quel avenir pour les dépenses de santé ? Note de politique économique de l'Ocde." Problemes Economiques(3127): 5-14, tab., graph.

> Cet article reprend partiellement une note de l'Ocde portant sur l'avenir des dépenses de santé. Il s'avère que la hausse des dépenses de santé et de soins de longue durée va continuer de peser sur les budgets publics au cours des prochaines décennies dans les pays de l'Ocde comme dans les pays émergents (BRIICS). Les dépenses s'accroîtront de manière soutenue en raison du vieillissement et de l'augmentation des maladies chroniques, et également sous l'effet conjugué du progrès technique et de l'envolée du prix relatifs des soins de longue durée.

de la Maisonneuve, C., Moreno-Serra, R., Murtin, F., et al. (2016). The drivers of public health spending: Integrating policies and institutions, OECD Publishing, OECD Economics Department Working Papers: 1283.
http://dx.doi.org/10.1787/5jm2f76rnhkj-en

> This paper investigates the impact of policies and institutions on health expenditures for a large panel of OECD countries for the period 2000-10. We use a set of 20 policy and institutional indicators developed by the OECD characterising the main supply-side, demand-side, and public management, coordination and financing features of health systems. The impact of these indicators is tested alongside control variables related to demographic (dependency ratio) and non-demographic (income, prices and technology) drivers of health expenditures per capita. Overall, there is a reasonably good fit between the expected signs of the coefficients for the institutional indicators and the actual estimates. By integrating the role of policies and institutions, together with the other primary determinants, our analysis is able to explain most of the cross-country variation in public health expenditures.

Dieleman, J. L., Templin, T., Sadat, N., et al. (2016). "National spending on health by source for 184 countries between 2013 and 2040." Lancet **387**(10037): 2521-2535.

BACKGROUND: A general consensus exists that as a country develops economically, health spending per capita rises and the share of that spending that is prepaid through government or private mechanisms also rises. However, the speed and magnitude of these changes vary substantially across countries, even at similar levels of development. In this study, we use past trends and relationships to estimate future health spending, disaggregated by the source of those funds, to identify the financing trajectories that are likely to occur if current policies and trajectories evolve as expected. METHODS: We extracted data from WHO's Health Spending Observatory and the Institute for Health Metrics and Evaluation's Financing Global Health 2015 report. We converted these data to a common purchasing power-adjusted and inflation-adjusted currency. We used a series of ensemble models and observed empirical norms to estimate future government out-of-pocket private prepaid health spending and development assistance for health. We aggregated each country's estimates to generate total health spending from 2013 to 2040 for 184 countries. We compared these estimates with each other and internationally recognised benchmarks. FINDINGS: Global spending on health is expected to increase from US$7.83 trillion in 2013 to $18.28 (uncertainty interval 14.42-22.24) trillion in 2040 (in 2010 purchasing power parity-adjusted dollars). We expect per-capita health spending to increase annually by 2.7% (1.9-3.4) in high-income countries, 3.4% (2.4-4.2) in upper-middle-income countries, 3.0% (2.3-3.6) in lower-middle-income countries, and 2.4% (1.6-3.1) in low-income countries. Given the gaps in current health spending, these rates provide no evidence of increasing parity in health spending. In 1995 and 2015, low-income countries spent $0.03 for every dollar spent in high-income countries, even after adjusting for purchasing power, and the same is projected for 2040. Most importantly, health spending in many low-income countries is expected to remain low. Estimates suggest that, by 2040, only one (3%) of 34 low-income countries and 36 (37%) of 98 middle-income countries will reach the Chatham House goal of 5% of gross domestic product consisting of government health spending. INTERPRETATION: Despite remarkable health gains, past health financing trends and relationships suggest that many low-income and lower-middle-income countries will not meet internationally set health spending targets and that spending gaps between low-income and high-income countries are unlikely to narrow unless substantive policy interventions occur. Although gains in health system efficiency can be used to make progress, current trends suggest that meaningful increases in health system resources will require concerted action. FUNDING: Bill & Melinda Gates Foundation.

Jung, J., Tran, C. et Chambers, M. (2016). Aging and Health Financing in the US:A General Equilibrium Analysis, Australian National University, College of Business and Economics, School of Economics, ANU Working Papers in Economics and Econometrics.
https://www.cbe.anu.edu.au/researchpapers/econ/wp641.pdf

We quantify the effects of population aging on the US healthcare system. Our analysis is based on a stochastic general equilibrium overlapping generations model of endogenous health accumulation calibrated to match pre-2010 U.S. data. We find that population aging not only leads to large increases in medical spending but also a large shift in the relative size of public vs. private insurance. Without the Affordable Care Act (ACA), aging itself leads to a 36:6 percent increase in health expenditures by 2060 and a 5 percent increase in GDP which is driven by the expansion of the healthcare sector. The group-based health insurance (GHI) market shrinks, while the individual-based health insurance (IHI) market and Medicaid expand significantly. Additional funds equivalent to roughly 4 percent of GDP are required to finance Medicare in 2060 as the elderly dependency ratio increases. The introduction of the ACA increases the fraction of insured workers to 99 percent by 2060, compared to 81 percent without the ACA. This additional increase is mainly driven by the further expansion of Medicaid and the IHI market and the stabilization of the GHI market. Interestingly, the

ACA reduces aggregate health care spending by enrolling uninsured workers into Medicaid which pays lower prices for medical services. Overall, the ACA adds to the fiscal cost of population aging mainly via the Medicare and Medicaid expansion.

Keehan, S. P., Poisal, J. A., Cuckler, G. A., et al. (2016). "National Health Expenditure Projections, 2015-25: Economy, Prices, And Aging Expected To Shape Spending And Enrollment." Health Aff (Millwood) **35**(8): 1522-1531.

Health spending growth in the United States for 2015-25 is projected to average 5.8 percent-1.3 percentage points faster than growth in the gross domestic product-and to represent 20.1 percent of the total economy by 2025. As the initial impacts associated with the Affordable Care Act's coverage expansions fade, growth in health spending is expected to be influenced by changes in economic growth, faster growth in medical prices, and population aging. Projected national health spending growth, though faster than observed in the recent history, is slower than in the two decades before the recent Great Recession, in part because of trends such as increasing cost sharing in private health insurance plans and various Medicare payment update provisions. In addition, the share of total health expenditures paid for by federal, state, and local governments is projected to increase to 47 percent by 2025.

Licchetta, M. et Stelmach, M. (2016). Fiscal sustainability and public spending on health. Fiscal sustainability analytical paper. Londres Office for Budget Responsibility**:** 39 , graph., fig. http://budgetresponsibility.org.uk/download/fiscal-sustainability-analytical-paper-fiscal-sustainability-public-spending-health/

This paper reviews the latest evidence on the demographic and non-demographic determinants of health spending in the UK and its implications for our long-term health spending projection. We find that demographic effects have explained only a small part of the increase in health spending over past decades and that they are likely to remain a relatively small, although growing, driver of spending in the future. Income effects are an important driver of real health spending, though not of spending as a share of GDP. Most significantly, other cost pressures (for example increasing relative health care costs and technological advancements) have been bigger contributing factors over the past and are likely to remain important drivers of spending in the future. We find that our long-term projection is particularly sensitive to the inclusion of non-zero estimates of other cost pressures. A key implication of this paper for our long-term health spending projection is therefore that we should recognise and quantify an explicit non-zero assumption about other cost pressures. Given the scale of uncertainty around these pressures, sensitivity analysis will remain vital when presenting our long-term fiscal projections.

Younsi, M., Chakroun, M. et Nafla, A. (2016). "Robust analysis of the determinants of healthcare expenditure growth: evidence from panel data for low-, middle- and high-income countries." Int J Health Plann Manage **31**(4): 580-601.

This paper examines the determinants of healthcare expenditure for low-, middle- and high-income countries, and it quantifies their influences in order to assess policies for achieving universal health coverage. We elaborate two models, a fixed-effect model and the dynamic panel model, to estimate the factors associated with the total health expenditure growth as well as its major components for 167 countries over the period of 1993-2013. The panel data on total health expenditure per capita and its components were taken from the World Development Indicators. Overall, our results showed that total health expenditure per capita is rising in all countries over time as a result of rising incomes. However, our estimates showed that the income elasticity of health expenditure ranged from 0.75 to 0.96 in the

fixed-effect static panel model, while in the dynamic panel model, it was smaller and ranged from 0.16 to 0.47. Our empirical findings indicate that development assistance for health reduced government domestic spending on health but increased total government health spending. Our results also indicate that the trend in health expenditure growth is significantly depending with the country's economic development. In addition, out-of-pocket expenditure is powerfully influenced by a country's capacity to increase general government revenues and social insurance contributions. Knowledge of factors associated to health expenditure might help policy makers to make wise judgments, plan health reforms and allocate resources efficiently. Copyright (c) 2016 John Wiley & Sons, Ltd.

2015

Breyer, F., et al. (2015). "Health care expenditures and longevity: is there a Eubie Blake effect?" Eur J Health Econ **16**(1): 95-112.

It is still an open question whether increasing life expectancy as such causes higher health care expenditures (HCE) in a population. According to the "red herring" hypothesis, the positive correlation between age and HCE is exclusively due to the fact that mortality rises with age and a large share of HCE is caused by proximity to death. As a consequence, rising longevity-through falling mortality rates-may even reduce HCE. However, a weakness of many previous empirical studies is that they use cross-sectional evidence to make inferences on a development over time. In this paper, we analyse the impact of rising longevity on the trend of HCE over time by using data from a pseudo-panel of German sickness fund members over the period 1997-2009. Using (dynamic) panel data models, we find that age, mortality and 5-year survival rates each have a positive impact on per-capita HCE. Our explanation for the last finding is that physicians treat patients more aggressively if the results of these treatments pay off over a longer time span, which we call "Eubie Blake effect". A simulation on the basis of an official population forecast for Germany is used to isolate the effect of demographic ageing on real per-capita HCE over the coming decades. We find that, while falling mortality rates as such lower HCE, this effect is more than compensated by an increase in remaining life expectancy so that the net effect of ageing on HCE over time is clearly positive.

Getzen, T. E. et Cheffler, R. / éd. (2015). Measuring and Forecasting. In : Global Health Expenditures. Global Health Economics and Public Policy., Singapore : World scientific**:** 37.
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2542826

Section I of this chapter briefly reviews the literature on medical spending, which suggests that health expenditures began small but steadily increased throughout history (from 1 percent to 4 percent of GDP), then began to increase rapidly among wealthier developed countries after 1950. Section II examines temporal and spatial dimensions of measurement, which suggest that the evolution of global health expenditures may be best observed by tracking health expenditures as a share of GDP over decades. Nominal and real per capita amounts are subject to distortions created by lags and currency valuation. Months and years are too short a span, while persons, households and provinces are too small. Section III covers growth in the components of health expenditures (population, income, inflation, excess due to technology and other factors). A model of national health expenditure decisions over time is presented and used to explain empirical findings of varying distributed lag responses to macroeconomic growth and development. Section IV considers the methods and accuracy of national health expenditure forecasting. Section V addresses some problems

of variable identification, with specific applications to population aging and the aggregate fiscal burden of care for the elderly. Section

Hennessy, D. A., et al. (2015). "The Population Health Model (POHEM): an overview of rationale, methods and applications." Population Health Metrics **13**(1): 24. http://dx.doi.org/10.1186/s12963-015-0057-x

The POpulation HEalth Model (POHEM) is a health microsimulation model that was developed at Statistics Canada in the early 1990s. POHEM draws together rich multivariate data from a wide range of sources to simulate the lifecycle of the Canadian population, specifically focusing on aspects of health. The model dynamically simulates individuals' disease states, risk factors, and health determinants, in order to describe and project health outcomes, including disease incidence, prevalence, life expectancy, health-adjusted life expectancy, quality of life, and healthcare costs. Additionally, POHEM was conceptualized and built with the ability to assess the impact of policy and program interventions, not limited to those taking place in the healthcare system, on the health status of Canadians. Internationally, POHEM and other microsimulation models have been used to inform clinical guidelines and health policies in relation to complex health and health system problems. This paper provides a high-level overview of the rationale, methodology, and applications of POHEM. Applications of POHEM to cardiovascular disease, physical activity, cancer, osteoarthritis, and neurological diseases are highlighted.

Herring, B. et Trish, E. (2015). "Explaining the Growth in US Health Care Spending Using State-Level Variation in Income, Insurance, and Provider Market Dynamics." Inquiry **52**.

The slowed growth in national health care spending over the past decade has led analysts to question the extent to which this recent slowdown can be explained by predictable factors such as the Great Recession or must be driven by some unpredictable structural change in the health care sector. To help address this question, we first estimate a regression model for state personal health care spending for 1991-2009, with an emphasis on the explanatory power of income, insurance, and provider market characteristics. We then use the results from this simple predictive model to produce state-level projections of health care spending for 2010-2013 to subsequently compare those average projected state values with actual national spending for 2010-2013, finding that at least 70% of the recent slowdown in health care spending can likely be explained by long-standing patterns. We also use the results from this predictive model to both examine the Great Recession's likely reduction in health care spending and project the Affordable Care Act's insurance expansion's likely increase in health care spending.

Keehan, S. P., et al. (2015). "National health expenditure projections, 2014-24: spending growth faster than recent trends." Health Aff (Millwood) **34**(8): 1407-1417.

Health spending growth in the United States is projected to average 5.8 percent for 2014-24, reflecting the Affordable Care Act's coverage expansions, faster economic growth, and population aging. Recent historically low growth rates in the use of medical goods and services, as well as medical prices, are expected to gradually increase. However, in part because of the impact of continued cost-sharing increases that are anticipated among health plans, the acceleration of these growth rates is expected to be modest. The health share of US gross domestic product is projected to rise from 17.4 percent in 2013 to 19.6 percent in 2024.

Squires, D. et Anderson, C. (2015). "U.S. health care from a global perspective: spending, use of

services, prices, and health in 13 countries." Issue Brief (Commonw Fund) **15**: 1-15.

This analysis draws upon data from the Organization for Economic Cooperation and Development and other cross-national analyses to compare health care spending, supply, utilization, prices, and health outcomes across 13 high-income countries: Australia, Canada, Denmark, France, Germany, Japan, Netherlands, New Zealand, Norway, Sweden, Switzerland, the United Kingdom, and the United States. These data predate the major insurance provisions of the Affordable Care Act. In 2013, the U.S. spent far more on health care than these other countries. Higher spending appeared to be largely driven by greater use of medical technology and higher health care prices, rather than more frequent doctor visits or hospital admissions. In contrast, U.S. spending on social services made up a relatively small share of the economy relative to other countries. Despite spending more on health care, Americans had poor health outcomes, including shorter life expectancy and greater prevalence of chronic conditions.

Wouterse, B., et al. (2015). "The effect of trends in health and longevity on health services use by older adults." BMC Health Serv Res **15**: 574.

BACKGROUND: The effect of population aging on future health services use depends on the relationship between longevity gains and health. Whether further gains in life expectancy will be paired by improvements in health is uncertain. We therefore analyze the effect of population ageing on health services use under different health scenarios. We focus on the possibly diverging trends between different dimensions of health and their effect on health services use. METHODS: Using longitudinal data on health and health services use, a latent Markov model has been estimated that includes different dimensions of health. We use this model to perform a simulation study and analyze the health dynamics that drive the effect of population aging. We simulate three health scenarios on the relationship between longevity and health (expansion of morbidity, compression of morbidity, and the dynamic equilibrium scenario). We use the scenarios to predict costs of health services use in the Netherlands between 2010 and 2050. RESULTS: Hospital use is predicted to decline after 2040, whereas long-term care will continue to rise up to 2050. Considerable differences in expenditure growth rates between scenarios with the same life expectancy but different trends in health are found. Compression of morbidity generally leads to the lowest growth. The effect of additional life expectancy gains within the same health scenario is relatively small for hospital care, but considerable for long-term care. CONCLUSIONS: By comparing different health scenarios resulting in the same life expectancy, we show that health improvements do contain costs when they decrease morbidity but not mortality. This suggests that investing in healthy aging can contribute to containing health expenditure growth.

Zhao, J. (2015). Forecasting Health Expenditure: Methods and Applications to International Databases. Hamilton CHEPA**:** 52 , tab., graph., fig.
http://www.chepa.org/docs/default-source/default-document-library/zhao-2015-forecasting-health-expenditure_chepa-working-paper.pdf?sfvrsn=0

Health expenditures have been increasing in the past decades among developed and developing countries. Forecasting health expenditures is crucial for policy applications required by governmental organizations and central banks. For example, under-predicting public health expenditures can result in unmet health needs that are eligible for public support, or in shortages of infrastructure invest-ments in hospitals and health human resources. Excess public health expenditure on hospitals and physician services crowds out financial resources that might have been allocated to other equally important sectors such as education for human capital accumulation. It may also absorb labor that could have been

directed to the final goods sector and hence reduce manufacturing outputs, which in turn may hurt both welfare and economic growth over time. This paper primarily addresses the methodological question: how can we best forecast health expenditure in a systematic way? It then answers the empirical question: given our best estimates, how much would worldwide health expenditures be in the short- and medium-run future (e.g., 2015-2025)? This paper examines a comprehensive set of measurements and projection models for forecasting health expenditures, and carefully tests their forecast performance based on formal criteria and by using recent and comparable data provided by international sources. The methods and empirical results of health expenditure forecasts can inform the policy making process by projecting needed funds and identifying gaps between the amounts of monetary resources needed and those available.

2014

Conway, A., et al. (2014). "The implications of regional and national demographic projections for future GMS costs in Ireland through to 2026." BMC Health Serv Res **14**: 477.

BACKGROUND: As the health services in Ireland have become more resource-constrained, pressure has increased to reduce public spending on community drug schemes such as General Medical Services (GMS) drug prescribing and to understand current and future trends in prescribing. The GMS scheme covers approximately 37% of the Irish population in 2011 and entitles them, inter alia, to free prescription drugs and appliances. This paper projects the effects of future changes in population, coverage, claims rates and average claims cost on GMS costs in Ireland. METHODS: Data on GMS coverage, claims rates and average cost per claim are drawn from the Primary Care Reimbursement Service (PCRS) and combined with Central Statistics Office (CSO) (Regional and National Population Projections through to 2026). A Monte Carlo Model is used to simulate the effects of demographic change (by region, age, gender, coverage, claims rates and average claims cost) will have on GMS prescribing costs in 2016, 2021 and 2026 under different scenarios. RESULTS: The Population of Ireland is projected to grow by 32% between 2007 and 2026 and by 96% for the over 70s. The Eastern region is estimated to grow by 3% over the lifetime of the projections at the expense of most other regions. The Monte Carlo simulations project that females will be a bigger driver of GMS costs than males. Midlands region will be the most expensive of the eight old health board regions. Those aged 70 and over and children under 11 will be significant drivers of GMS costs with the impending demographic changes. Overall GMS medicines costs are projected to rise to euro1.9bn by 2026. CONCLUSIONS: Ireland's population will experience rapid growth over the next decade. Population growth coupled with an aging population will result in an increase in coverage rates, thus the projected increase in overall prescribing costs. Our projections and simulations map the likely evolution of GMS cost, given existing policies and demographic trends. These costs can be contained by government policy initiatives.

De, Lamaisonneuve, C. et Oliveria-Martins, J. (2014). "The future of health and long-term care spending." OECD Journal: Economic Studies **2014**(1): 38 , tab., graph., fig.

This paper proposes a new set of public health and long-term care expenditure projections until 2060, following up on the previous set of projections published in 2006. It disentangles health from long-term care expenditure as well as the demographic from the non-demographic drivers, and refines the previous methodology, in particular by better identifying the underlying determinants of health and long-term care spending and by extending the country coverage to include BRIICS countries. A cost-containment and a cost-

pressure scenario are provided together with sensitivity analysis. On average across OECD countries, total health and long-term care expenditure is projected to increase by 3.3 and 7.7 percentage points of GDP between 2010 and 2060 in the cost-containment and the cost-pressure scenarios, respectively. For the BRIICS over the same period, it is projected to increase by 2.8 and 7.3 percentage points of GDP in the cost containment and the cost-pressure scenarios, respectively.

de la Maisonneuve, C. et Oliveira Martins, J. (2014). "The Future of Health and Long-Term Care Spending." OECD Journal: Economic Studies **2014**: 61-96.
http://www.oecd-ilibrary.org/economics/oecd-journal-economic-studies_19952856

This paper proposes a new set of public health and long-term care expenditure projections until 2060, following up on the previous set of projections published in 2006. It disentangles health from long-term care expenditure as well as the demographic from the non-demographic drivers, and refines the previous methodology, in particular by better identifying the underlying determinants of health and long-term care spending and by extending the country coverage to include BRIICS countries. A cost-containment and a cost-pressure scenario are provided together with sensitivity analysis. On average across OECD countries, total health and long-term care expenditure is projected to increase by 3.3 and 7.7 percentage points of GDP between 2010 and 2060 in the cost-containment and the cost-pressure scenarios, respectively. For the BRIICS over the same period, it is projected to increase by 2.8 and 7.3 percentage points of GDP in the cost-containment and the cost-pressure scenarios, respectively.

Geue, C., et al. (2014). "Population ageing and healthcare expenditure projections: new evidence from a time to death approach." Eur J Health Econ **15**(8): 885-896.

BACKGROUND: Health care expenditure (HCE) is not distributed evenly over a person's life course. How much is spent on the elderly is important as they are a population group that is increasing in size. However other factors, such as death-related costs that are known to be high, need be considered as well in any expenditure projections and budget planning decisions. OBJECTIVE: This article analyses, for the first time in Scotland, how expenditure projections for acute inpatient care are influenced when applying two different analytical approaches: (1) accounting for healthcare (HC) spending at the end of life and (2) accounting for demographic changes only. The association between socioeconomic status and HC utilisation and costs at the end of life is also estimated. METHODS: A representative, longitudinal data set is used. Survival analysis is employed to allow inclusion of surviving sample members. Cost estimates are derived from a two-part regression model. Future population estimates were obtained for both methods and multiplied separately by cost estimates. RESULTS: Time to death (TTD), age at death and the interaction between these two have a significant effect on HC costs. As individuals approach death, those living in more deprived areas are less likely to be hospitalised than those individuals living in the more affluent areas, although this does not translate into incurring statistically significant higher costs. Projected HCE for acute inpatient care for the year 2028 was approximately 7% higher under the demographic approach as compared to a TTD approach. CONCLUSION: The analysis showed that if death is postponed into older ages, HCE (and HC budgets) would not increase to the same extent if these factors were ignored. Such factors would be ignored if the population that is in their last year(s) of life were not taken into consideration when obtaining cost estimates.

Hoeymans, N., et al. (2014). "[Living longer, with more disease and less disability; trends in public health 2000-2030]." Ned Tijdschr Geneeskd **158**: A7819.

The Dutch Public Health Status and Foresight report 2014 explores the future of public health in the Netherlands, using a trend scenario and four future scenarios. The trend scenario provides projections until 2030, based on the trends over the last decades and assuming the policy stays the same. After many years the unfavourable trends in lifestyle seem to have ended: the percentage of smokers is decreasing and the percentage of people who are overweight is no longer increasing. Life expectancy will continue to increase, but the differences between socioeconomic groups will not become smaller. Demographic changes (rise in the ageing population) and improvements in health care will contribute to an increase in the number of chronically ill which will increase from 5.3 million in 2011 to 7 million in 2030. However, most people with a chronic disease feel healthy, have no disabilities and participate fully in society. Health care expenditures rose from 9.5% of the GDP in 2000 to 14% in 2012. How this growth will continue in the next years is uncertain.

Hosoya, K. (2014). "Determinants of Health Expenditures: Stylized Facts and a New Signal." Modern Economy **5**(13): 1171-1180.
http://www.scirp.org/journal/me/

This article further investigates the determinants of health expenditures by using aggregate data. Specifically, a panel data analysis of 25 OECD countries reveals that under several model specifications, the proxy for population ageing has no effect on health costs in accordance with recent findings. In contrast to this well-known result, an additional estimation conducted to check robustness revealed that the ageing variable becomes positive and significant. The significant effect may provide a new signal for a determinant of health expenditures. This result suggests that ageing is an important factor that cannot be ignored when considering variations in health expenditures.

Lassila, J. et Valkonen, T. (2014). Longevity- Working Lives and Public Finances. ETLA Working Papers No 24. Helsinki ETLA**:** 17 , fig., tabl.
http://pub.etla.fi/ETLA-Working-Papers-24.pdf

Can longer working lives bring sufficient tax revenues to pay for the growing public health and care expenditure that longer lifetimes cause? We review studies concerning retirement decisions and pension policies, the role of mortality in health and long-term care costs, and errors in mortality projections. We combine key results into a numerical OLG model where changes in mortality have direct effects both on working careers and on per capita use of health and long-term care services. The model has been calibrated to the Finnish economy and demographics. Although there are huge uncertainties concerning future health and long-term care expenditure when people live longer, our simulations show that without policies directed to disability admission rules and old-age pension eligibility ages, working lives are unlikely to extend sufficiently. But, importantly, with such policies it seems quite possible that generations enjoying longer lifetimes can also pay for the full costs by working longer.

Morgan, D. et Astolfi, R. (2014). Health Spending Continues to Stagnate in Many OECD Countries. OECD Health Working Paper; 68. Paris OCDE**:** 25 , tabl.

The global economic crisis which began in 2008 has had a dramatic effect on health spending across OECD countries. Estimates of expenditure on health released back in 2012 showed that, for the first time, health spending had slowed markedly or fallen across many OECD countries after years of continuous growth. As a result, close to zero growth in health expenditure was recorded on average in 2010. Preliminary estimates suggested that the low or negative growth in health spending was set to continue in many OECD countries in

following years...

Rebba, V. (2014). The Long-Term Sustainability Of European Health Care Systems. Padoue Université de Padoue**:** 49 , tabl., fig.
http://economia.unipd.it/sites/decon.unipd.it/files/20140191.pdf

Over the past thirty years, health expenditure has grown at a faster rate than the economy in almost every OECD country. The main drivers of public health spending are income growth, insurance coverage, demographics, and, above all, technological change. According to the projections of the major international institutions (European Commission, OECD, International Monetary Fund), public health spending for the of EU-15 countries could significantly increase by 2050. These projections vary in an extremely wide range, between +27% and +84%, depending on the assumptions made. However, the big challenge will be the growth of public spending on long-term care which could more than double over the 2010-2050 period, owing to the sharp rise of frailty and disability at older ages, especially amongst the very old (aged 80+) which will be the fastest growing segment of the EU population in the decades to come. The European countries are facing a common challenge: the need to secure the economic and financial sustainability of their health care systems without undermining the values of universal coverage and solidarity in financing. Command and control policies aimed at expenditure restraints and largely operating through regulatory controls (controls over inputs and wages, budget caps, etc.) are widely used during periods of recession. They can hold expenditures down in the short term. However, they do little or nothing to moderate the underlying pressures which push health spending up over the long-run. Other policies to guarantee both economic and financial sustainability in the long-run should be explored: 1) the adoption of new regulation tools on supply and demand side; 2) a new balanced mix of public and private financing, strengthening the role of supplementary private health insurance, to allow investment and innovation, without imposing unsustainable burdens on public budgets and without denying care to the disadvantaged. The former policies focus on economic sustainability, improving the way health systems address the rise in chronic disease and seek to incentive and reward patients, providers and buyers for healthy behaviour, quality and efficiency of care. The latter policies could ensure long-term financial stability of the health care systems but may determine negative effects in terms of equity and, therefore, they must be carefully designed.

Scheffler, R. é. (2014). Measuring and Forecasting Global Health Expenditures. Global Health Economics and Policy, Singapour : World Scientific**:** C, 22 +annexes.
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2542826

Section I of this chapter briefly reviews the literature on medical spending, which suggests that health expenditures began small but steadily increased throughout history (from 1 percent to 4 percent of GDP), then began to increase rapidly among wealthier developed countries after 1950. Section II examines temporal and spatial dimensions of measurement, which suggest that the evolution of global health expenditures may be best observed by tracking health expenditures as a share of GDP over decades. Nominal and real per capita amounts are subject to distortions created by lags and currency valuation. Months and years are too short a span, while persons, households and provinces are too small. Section III covers growth in the components of health expenditures (population, income, inflation, excess due to technology and other factors). A model of national health expenditure decisions over time is presented and used to explain empirical findings of varying distributed lag responses to macroeconomic growth and development. Section IV considers the methods and accuracy of national health expenditure forecasting. Section V addresses some problems of variable identification, with specific applications to population aging and the aggregate

fiscal burden of care for the elderly. Section VI discusses the sustainability of current trends and the boundaries between long-term care, retirement and medical expenditures. It concludes by proposing that rising longevity and medical costs are best viewed as aspects of a process of economic and human development transforming the 20th and 21st centuries, rather than as isolated phenomena. The six sections each conclude with a discussion of policy implications, even the most technical sections regarding measurement, aggregation and lags, where the policy implications may not be immediately apparent. While nominal policies are publicly stated, it is often these "technical details" regarding boundary definition, timing and measurement that show how policy actually operates, that shape public opinion, and that drive future financial decisions.

Sisko, A. M., et al. (2014). "National health expenditure projections, 2013-23: faster growth expected with expanded coverage and improving economy." Health Aff (Millwood) **33**(10): 1841-1850.

In 2013 health spending growth is expected to have remained slow, at 3.6 percent, as a result of the sluggish economic recovery, the effects of sequestration, and continued increases in private health insurance cost-sharing requirements. The combined effects of the Affordable Care Act's coverage expansions, faster economic growth, and population aging are expected to fuel health spending growth this year and thereafter (5.6 percent in 2014 and 6.0 percent per year for 2015-23). However, the average rate of increase through 2023 is projected to be slower than the 7.2 percent average growth experienced during 1990-2008. Because health spending is projected to grow 1.1 percentage points faster than the average economic growth during 2013-23, the health share of the gross domestic product is expected to rise from 17.2 percent in 2012 to 19.3 percent in 2023.

2013

Appleby, J. (2013). Spending on health and social care over the next 50 years. Why think long term? Londres King's Fund Institute**:** 55 , fig., tabl.
http://www.kingsfund.org.uk/sites/files/kf/field/field_publication_file/Spending%20on%20health%20...%2050%20years%20low%20res%20for%20web.pdf

In the past 50 years, spending on the NHS in the United Kingdom has increased from 3.4 per cent to 8.2 per cent of gross domestic product (GDP). If the next 50 years follow the same trajectory, the United Kingdom could be spending nearly one-fifth of its entire GDP on the public provision of health and social care. This report considers the drivers of spending on health and long-term care, and asks whether spending must or should consume such large proportions of GDP in the future, and the fiscal feasibility of this. It examines the evidence that spending will inexorably rise, considers projections and high-level modelling of future health spending both in the United Kingdom and internationally, and debates alternative systems of assessing current and future spending. Finally, the report suggests a need for engaged and informed public debate about the choices to be made in future spending on health and social care

Blanco-Moreno, A., et al. (2013). "Public healthcare expenditure in Spain: measuring the impact of driving factors." Health Policy **111**(1): 34-42.

OBJECTIVES: To assess the impact of demography, health status, death related costs and some macroeconomic variables on the evolution of health expenditure. METHODS: We follow the methodology used by the Ageing Working Group (AWG) of the European Union to simulate expenditure projections on the basis of healthcare expenditure profiles for age-sex

population groups. We estimate the profiles using data from Hospital Discharges Statistics and the Spanish National Health Survey. RESULTS: The differences between the compression of morbidity scenario and the expansion of morbidity scenario range from 1.35 to 1.57 points of GDP in 2060. The overestimation of healthcare expenditure when death related costs are ignored ranges from 0.04 to 0.11 percentage points, depending on the health status hypothesis. Moreover, the effect of death related cost diminishes as health status improves. CONCLUSIONS: Our results support the fact that intensity of healthcare use, instead of ageing, is the main driver of health expenditure. Thus, the concern of keeping expenditure under control should be focused on factors such as the population's health status, economic growth and development, new technologies and medical progress, and the organization and management of the healthcare system.

Chandra, A., et al. (2013). Is This Time Different? The Slowdown in Healthcare Spending. NBER Working Paper Series ; 19700. Cambridge NBER**:** 55 , fig., tabl.
http://papers.nber.org/papers/w19700

Why have health care costs moderated in the last decade? Some have suggested the Great Recession alone was the cause, but health expenditure growth in the depths of the recession was nearly identical to growth prior to the recession. Nor can the Affordable Care Act (ACA) can take credit, since the slowdown began prior to its implementation. Instead, we identify three primary causes of the slowdown: the rise in high-deductible insurance plans, state-level efforts to control Medicaid costs, and a general slowdown in the diffusion of new technology, particularly in the Medicare population. A more difficult question is: Will this slowdown continue? Here we are more pessimistic, and not entirely because a similar (and temporary) slowdown occurred in the early 1990s. The primary determinant of long-term growth is the continued development of expensive technology, and there is little evidence of a permanent slowdown in the technology pipeline. Proton beam accelerators are on target to double between 2010 and 2014, while the market for heart-assist devices (costing more than $300,000) is projected to grow rapidly. Accountable care organizations (ACOs) and emboldened insurance companies may yet stifle health care cost growth, but our best estimate over the next two decades is that health care costs will grow at GDP plus 1.2 percent; lower than previous estimates but still on track to cause serious fiscal pain for taxpayers and workers who bear the costs of higher premiums.

Cordova, A., et al. (2013). "The COMPARE Microsimulation Model and the U.S. Affordable Care Act." International Journal of Microsimulation **6**(3): 78-117.
http://www.microsimulation.org/ijm/issues/

In anticipation of upcoming health care legislation, the RAND Corporation developed a microsimulation model to forecast the responses of individuals, families, and firms to such legislation. The COMPARE (COMPrehensive Assessment of Reform Efforts) microsimulation has been used to estimate the impact of major policy changes in the United States, such as the Affordable Care Act on uninsurance rates, participation in the group and the non-group insurance markets, firms' insurance offer rates, enrollment in public programs such as Medicaid and CHIP, private insurance premiums, and costs to the federal and state governments. The team selected utility maximization to model behaviors, a methodology that is better suited than spreadsheet or econometric models to predict how individuals, households, and firms will respond to wholly new insurance options, such as the Health Insurance Marketplace and the Small Business Health Options Program (SHOP) Exchanges created by the Affordable Care Act. Modeling can be done both at the national and at a state-specific levels. In this paper, we provide a summary of COMPARE's basic principles, its nationally representative databases, its utility-maximization behavioral models, and how we

have used COMPARE to estimate the consequences of the Affordable Care Act.

Cuckler, G. A., et al. (2013). "National health expenditure projections, 2012-22: slow growth until coverage expands and economy improves." Health Aff (Millwood) **32**(10): 1820-1831.

Health spending growth through 2013 is expected to remain slow because of the sluggish economic recovery, continued increases in cost-sharing requirements for the privately insured, and slow growth for public programs. These factors lead to projected growth rates of near 4 percent through 2013. However, improving economic conditions, combined with the coverage expansions in the Affordable Care Act and the aging of the population, drive faster projected growth in health spending in 2014 and beyond. Expected growth for 2014 is 6.1 percent, with an average projected growth of 6.2 percent per year thereafter. Over the 2012-22 period, national health spending is projected to grow at an average annual rate of 5.8 percent. By 2022 health spending financed by federal, state, and local governments is projected to account for 49 percent of national health spending and to reach a total of $2.4 trillion.

De, Lamaisonneuve, C. et Oliveira, M.J., et al. (2013). A Projection Method for Public Health and Long-Term Care Expenditures. OECD Economics Department Working Papers ; 1048. Paris OCDE**:** 72 , tabl., fig.
http://dx.doi.org/10.1787/5k44v53w5w47-en

Ce papier présente une nouvelle série de projections des dépenses publiques de santé et de soins de longue durée jusqu'en 2060, sept ans après la publication d'une première série de projections par l'OCDE. Le papier étudie la santé et les soins de longue durée séparément ainsi que les déterminants démographiques et non-démographiques et il affine la méthodologie adoptée précédemment, en particulier, en augmentant le nombre de pays couverts. En ce qui concerne la santé, les déterminants non-démographiques sont identifiés, l'analyse effectuée dans ce papier tentant de mieux comprendre la croissance résiduelle des dépenses en déterminant quelle part peut être attribuée à l'évolution des prix de la santé et de la technologie. En ce qui concerne les soins de longue durée, une estimation des déterminants du nombre de dépendants (personnes nécessitant de l'aide dans les activités de la vie quotidienne) est utilisée. Un scénario de maîtrise des coûts et un scénario de tension sur les coûts sont élaborés ainsi qu'une analyse de sensibilité. En moyenne sur l'ensemble des pays de l'OCDE, entre 2010 et 2060, le total des dépenses de santé et de soins de longue durée devrait augmenter de 3.3 points de pourcentage de PIB dans le scénario de maîtrise des coûts et de 7.7 points de pourcentage de PIB dans le scénario de tension sur les coûts. Pour les BRIICS sur la même période, il devrait augmenter de 2.8 points de pourcentage du PIB dans le scenario de maîtrise des coûts et de 7.3 points de pourcentage dans le scenario de tension sur les coûts.

De, Lamaisonneuve, C. et Oliveira, M., J. (2013). Public Spending on Health and Long-term Care: A new set of projections. OECD Economic Policy Papers; 6. Paris OCDE**:** 72 , tabl., fig.

This paper proposes a new set of public health and long-term care expenditure projections till 2060, following up on the previous set of projections published in 2006. It disentangles health from long term care expenditure as well as the demographic from the non-demographic drivers, and refines the previous methodology, in particular by better identifying the underlying determinants of health and long-term care spending and by extending the country coverage to include BRIICS countries. A costcontainment and a cost-pressure scenario are provided together with sensitivity analysis. On average across OECD countries, total health and long-term care expenditure is projected to increase by 3.3 and 7.7

percentage points of GDP between 2010 and 2060 in the cost-containment and the cost-pressure scenarios respectively. For the BRIICS over the same period, it is projected to increase by 2.8 and 7.3 percentage points of GDP in the co st-containment and the cost-pressure scenarios respectively.

de la Maisonneuve, C. et Martins, J. O. (2013). A Projection Method for Public Health and Long-Term Care Expenditures, OECD Publishing, OECD Economics Department Working Papers: 1048. http://dx.doi.org/10.1787/5k44v53w5w47-en

This paper proposes a new set of public health and long-term care expenditure projections until 2060, seven years after a first set of projections was published by the OECD. It disentangles health from long term care expenditure, as well as the demographic from the non-demographic drivers, and refines the previous methodology, in particular by extending the country coverage. Regarding health care, non demographic drivers are identified, with an attempt to better understand the residual expenditure growth by determining which share can be explained by the evolution of health prices and technology effects. Concerning LTC, an estimation of the determinants of the number of dependants (people needing help in their daily life activities) is provided. A cost-containment and a cost-pressure scenario are provided, together with sensitivity analysis. On average across OECD countries, total health and long-term care expenditure is projected to increase by 3.3 and 7.7 percentage points of GDP between 2010 and 2060 in the cost-containment and the cost-pressure scenarios respectively. For the BRIICS over the same period, it is projected to increase by 2.8 and 7.3 percentage points of GDP in the cost-containment and the cost-pressure scenarios respectively.

Morgan, D. et Astolfi, R. (2013). Health Spending Growth at Zero: Which Countries, Which Sectors Are Most Affected? OECD Health Working Paper; 60. Paris OCDE**:** 20, fig. http://dx.doi.org/10.1787/5k4dd1st95xv-en

Le présent document analyse en détail le récent ralentissement des dépenses de santé, en mettant l'accent sur les pays et les postes de dépenses les plus concernés. Il s'efforce ainsi d'établir des liens entre les chiffres en utilisant les données sur les dépenses et d'autres données tirées de la Base de données de l'OCDE sur la santé 2012 et certaines des diverses mesures mises en œuvre depuis le début de la crise économique. En outre, à l'aide des données préliminaires sur 2011 et d'exemples de mesures prises récemment, les perspectives d'évolution à court terme des dépenses de santé sont esquissées.

Ryu, A. J., et al. (2013). "The slowdown in health care spending in 2009-11 reflected factors other than the weak economy and thus may persist." Health Aff (Millwood) **32**(5): 835-840.

During and immediately after the recent recession, national health expenditures grew exceptionally slowly. During 2009-11 per capita national health spending grew about 3 percent annually, compared to an average of 5.9 percent annually during the previous ten years. Policy experts disagree about whether the slower health spending growth was temporary or represented a long-term shift. This study examined two factors that might account for the slowdown: job loss and benefit changes that shifted more costs to insured people. Based on an examination of data covering more than ten million enrollees with health care coverage from large firms in 2007-11, we found that these enrollees' out-of-pocket costs increased as the benefit design of their employer-provided coverage became less generous in this period. We conclude that such benefit design changes accounted for about one-fifth of the observed decrease in the rate of growth. However, we also observed a slowdown in spending growth even when we held benefit generosity constant, which

suggests that other factors, such as a reduction in the rate of introduction of new technology, were also at work. Our findings suggest cautious optimism that the slowdown in the growth of health spending may persist--a change that, if borne out, could have a major impact on US health spending projections and fiscal challenges facing the country.

2012

Astolfi, R., et al. (2012). A Comparative Analysis of Health Forecasting Methods. OECD Health Working Paper; 59. Paris OCDE**:** 117, tabl., fig., annexes.
http://dx.doi.org/10.1787/5k912j389bf0-en

Concerns about health care expenditure growth and its long-term sustainability have risen to the top of the policy agenda in many OECD countries. As continued growth in spending places pressure on government budgets, health services provision and patients? personal finances, policy makers in OECD countries have launched forecasting projects to support policy planning. This study presents a comparative analysis of health expenditure forecasting methods through examination of leading methods that have been used by health policy makers. Methods reviewed were selected on the basis of demonstrated institutional or governmental participation in the model development and/or policy applications of the model. The study aims to identify good practices in the development of health-spending forecasting models that can be shared among OECD countries. In so doing, it has the potential to enhance transparency and support improvement in future health expenditure modelling exercises. Section two of this paper describes the criteria for model selection and evaluation, and the review process. Section three discusses the policy questions that have been explored with forecasting models and provides an overview of some of the answers. More specific information on the classes of forecasting methods available to address these policy questions and their relative strengths and weaknesses is provided in Section four. Section five reviews the projected variables, and the time horizon of projections. The drivers of health spending growth that have been included in forecasting models and the assumptions associated with these drivers are discussed in Section six. This is followed by a discussion in Section seven of the criteria to assess the performance of forecasting methods. The conclusions point to next steps in the development of decision-support forecasting tools.

Astolfi, R., et al. (2012). "Informing policy makers about future health spending: a comparative analysis of forecasting methods in OECD countries." Health Policy **107**(1): 1-10.

OBJECTIVE: Concerns about health care expenditure growth and its long-term sustainability have risen to the top of the policy agenda in many OECD countries. As continued growth in spending places pressure on government budgets, health services provision and patients' personal finances, policy makers have launched forecasting projects to support policy planning. This comparative analysis reviewed 25 models that were developed for policy analysis in OECD countries by governments, research agencies, academics and international organisations. RESULTS: We observed that the policy questions that need to be addressed drive the choice of forecasting model and the model's specification. By considering both the level of aggregation of the units analysed and the level of detail of health expenditure to be projected, we identified three classes of models: micro, component-based, and macro. Virtually all models account for demographic shifts in the population, while two important influences on health expenditure growth that are the least understood include technological innovation and health-seeking behaviour. DISCUSSION: The landscape for health forecasting models is dynamic and evolving. Advances in computing technology and increases in data granularity are opening up new possibilities for the generation of system of models which

become an on-going decision support tool capable of adapting to new questions as they arise.

Figueras, J. et Mc, Kee, M. (2012). Health Systems, Health, Wealth and Societal Well-being. Assessing the case for investing in health systems. European Observatory on Health Systems and Policies Series. Maidenhead Open University Press**:** xxiv +304 , tabl., fig.
http://www.euro.who.int/__data/assets/pdf_file/0007/164383/e96159.pdf

This book looks at health systems from a new perspective. By reviewing the complex relationship between health systems, health and wealth, it argues that health systems need not be, as is often believed, simply a drag on resources but rather can be part and parcel of improving health and achieving better economic growth. Aiming to assist policy-makers as they assess the case for investing in health systems, this book reviews the evidence and analyses some of the lessons that can be drawn from that evidence.

Keehan, S. P., et al. (2012). "National health expenditure projections: modest annual growth until coverage expands and economic growth accelerates." Health Aff (Millwood) **31**(7): 1600-1612.

For 2011-13, US health spending is projected to grow at 4.0 percent, on average--slightly above the historically low growth rate of 3.8 percent in 2009. Preliminary data suggest that growth in consumers' use of health services remained slow in 2011, and this pattern is expected to continue this year and next. In 2014, health spending growth is expected to accelerate to 7.4 percent as the major coverage expansions from the Affordable Care Act begin. For 2011 through 2021, national health spending is projected to grow at an average rate of 5.7 percent annually, which would be 0.9 percentage point faster than the expected annual increase in the gross domestic product during this period. By 2021, federal, state, and local government health care spending is projected to be nearly 50 percent of national health expenditures, up from 46 percent in 2011, with federal spending accounting for about two-thirds of the total government share. Rising government spending on health care is expected to be driven by faster growth in Medicare enrollment, expanded Medicaid coverage, and the introduction of premium and cost-sharing subsidies for health insurance exchange plans.

Lipszyk, B., et al. (2012). Long-term care: need, use and expenditure in the EU-27. Economic Papers ; 469. Bruxelles Commission européenne**:** 87 , tabl., fig.
http://ec.europa.eu/economy_finance/publications/economic_paper/2012/pdf/ecp469_en.pdf

Public provision of long-term care (LTC) will pose an increasing challenge to the sustainability of public finances in the EU, due to an ageing population. In this view, the paper aims to provide indications on the timing and potential fiscal impact associated to changes in the demographic structure. The ageing of the population is expected to put pressure on governments to provide long-term care services as (very) old people often develop multi-morbidity conditions, which require not only long-term medical care but assistance with a number of daily tasks. This paper presents the projections of public expenditure on LTC in the long run (2060) under alternative assumptions. All scenarios project a non-negligible increase in public expenditure. All other things being equal, the expected increase in the demand for formal LTC support will vary across EU-27 Member States according to their current patterns of LTC provision: the balance between formal and informal care, the emphasis they put on institutional care, home care or provision of cash benefits, the supply constraints both in the formal and informal care sectors, the current average cost and coverage rate for each type of care and their distribution across age groups. The paper also discusses policy implications of the projection results.

van Baal, P. H. et Wong, A. (2012). "Time to death and the forecasting of macro-level health care expenditures: some further considerations." J Health Econ **31**(6): 876-887.

Although the effect of time to death (TTD) on health care expenditures (HCE) has been investigated using individual level data, the most profound implications of TTD have been for the forecasting of macro-level HCE. Here we estimate the TTD model using macro-level data from the Netherlands consisting of mortality rates and age- and gender-specific per capita health expenditures for the years 1981-2007. Forecasts for the years 2008-2020 of this macro-level TTD model were compared to forecasts that excluded TTD. Results revealed that the effect of TTD on HCE in our macro model was similar to those found in micro-econometric studies. As the inclusion of TTD pushed growth rate estimates from unidentified causes upwards, however, the two models' forecasts of HCE for the 2008-2020 were similar. We argue that including TTD, if modeled correctly, does not lower forecasts of HCE.

Wittenberg, R., et al. (2012). Care for older people. Projected expenditure to 2022 on social care and continuing health care for England's older population. Londres : The Nuffield Trust**:** 14 , fig.

Social care is crucial to the welfare of many older people. Some 80% will need care in the later years of their lives (Department of Health, 2012). Meeting the need for social care is set to be more challenging in the decades to come, as the number of older people continues to rise and public expenditure continues to be constrained (Crawford and Emmerson, 2012). This report sets out projections of public expenditure on social care and continuing health care for people aged 65 or over in England from 2010 to 2022.

2011

Bech, M., et al. (2011). "Ageing and health care expenditure in EU-15." European Journal of Health Economics (the) **12**(5): 469-478, 465 tabl.

The purpose of this paper is to investigate the relationship between ageing and the evolution of health care expenditure per capita in the EU-15 countries. A secondary purpose is to produce estimates that can be used in projections of future health care costs. Explanatory variables include economic, social, demographic and institutional variables as well as variables related to capacity and production technology in the health care sector. The study applies a co-integrated panel data regression approach to derive short-run relationships and furthermore reports long-run relationships between health care expenditure and the explanatory variables. Our findings suggest that there is a positive short-run effect of ageing on health care expenditure, but that the long-run effect of ageing is approximately zero. We find life expectancy to be a more important driver. Although the short-run effect of life expectancy on expenditure is approximately zero, we find that the long-run effect is positive, so that increasing life expectancy leads to a more than proportional, i.e. exponential, increase in health care expenditure.

de Meijer, C., et al. (2011). "Determinants of long-term care spending: age, time to death or disability?" J Health Econ **30**(2): 425-438.

In view of population aging, better understanding of what drives long-term care expenditure (LTCE) is warranted. Time-to-death (TTD) has commonly been used to project LTCE because it was a better predictor than age. We reconsider the roles of age and TTD by controlling for disability and co-residence and illustrate their relevance for projecting LTCE. We analyze

spending on institutional and homecare for the entire Dutch 55+ population, conditioning on age, sex, TTD, cause-of-death and co-residence. We further examined homecare expenditures for a sample of non-institutionalized conditioning additionally on disability. Those living alone or deceased from diabetes, mental illness, stroke, respiratory or digestive disease have higher LTCE, while a cancer death is associated with lower expenditures. TTD no longer determines homecare expenditures when disability is controlled for. This suggests that TTD largely approximates disability. Nonetheless, further standardization of disability measurement is required before disability could replace TTD in LTCE projections models.

Dodge, D. et Dion, R. (2011). Chronic Healthcare Spending Disease: A Macro Diagnosis and Prognosis**:** 12, tabl.

This report examines from a macroeconomic perspective the trajectory of total ? public and private ? healthcare spending in Canada over the next two decades. The purpose is to estimate the extent to which healthcare spending is going to absorb a greater fraction of income than Canadians have experienced to date under two scenarios: i) a ?baseline? one calculated from parameters estimated from historical experience, and ii) an ?optimistic? one calculated from parameters that assume an unprecedented improvement in the efficiency and effectiveness of the healthcare system and large improvement in the capacity for economic growth.

Keehan, S. P., et al. (2011). "National health spending projections through 2020: economic recovery and reform drive faster spending growth." Health Aff (Millwood) **30**(8): 1594-1605.

In 2010, US health spending is estimated to have grown at a historic low of 3.9 percent, due in part to the effects of the recently ended recession. In 2014, national health spending growth is expected to reach 8.3 percent when major coverage expansions from the Affordable Care Act of 2010 begin. The expanded Medicaid and private insurance coverage are expected to increase demand for health care significantly, particularly for prescription drugs and physician and clinical services. Robust growth in Medicare enrollment, expanded Medicaid coverage, and premium and cost-sharing subsidies for exchange plans are projected to increase the federal government share of health spending from 27 percent in 2009 to 31 percent by 2020. This article provides perspective on how the nation's health care dollar will be spent over the coming decade as the health sector moves quickly toward its new paradigm of expanded insurance coverage.

Malley, J., et al. (2011). "The effect of lengthening life expectancy on future pension and long-term care expenditure in England, 2007 to 2032." Health Stat Q(52): 33-61.

BACKGROUND: The aim of this analysis is to examine the effect of different assumptions about future trends in life expectancy (LE) on the sustainability of the pensions and long-term care (LTC) systems. The context is the continuing debate in England about the reform of state pensions and the reform of the system for financing care and support. METHODS: Macro and micro simulation models are used to make projections of future public expenditure on LTC services for older people and on state pensions and related benefits, making alternative assumptions on increases in future LE. The projections cover the period 2007 to 2032 and relate to England. RESULTS: Results are presented for a base case and for specified variants to the base case. The base case assumes that the number of older people by age and gender rises in line with the Office for National Statistics' principal 2006-based population projection for England. It also assumes no change in disability rates, no changes in patterns of care, no changes in policy and rises in unit care costs and real average earnings by 2 per cent per year. Under these assumptions public expenditure on pensions and related

benefits is projected to rise from 4.7 per cent of Gross Domestic Product (GDP) in 2007 to 6.2 per cent of GDP in 2032 and public expenditure on LTC from 0.9 per cent of GDP in 2007 to 1.6 per cent of GDP in 2032. Under a very high LE variant to the GAD principal projection, however, public expenditure on pensions and related benefits is projected to reach 6.8 per cent of GDP in 2032 and public expenditure on LTC 1.7 per cent of GDP in 2032. CONCLUSIONS: Policymakers developing reform proposals need to recognise that, since future LE is inevitably uncertain and since variant assumptions about future LE significantly affect expenditure projections, there is a degree of uncertainty about the likely impact of demographic pressures on future public expenditure on pensions and LTC.

(2010). Tendance et ruptures dans le domaine de la santé en Europe à l'horizon 2030 - synthèse. sl : Accenture**:** 20.
http://www.eih-eu.eu/Documents/founding_symposium_FR.pdf

Cette note de synthèse repose principalement sur la revue d'un nombre significatif d'études publiées en Europe sur la santé et les facteurs d'environnement tels que la démographie, l'économie, la sociologie ou encore l'évolution technologique touchant directement ou indirectement la santé. La très grande majorité des études met en lumière des tendances fondées sur un passé récent et en déduit des projections à moyen terme. Rares sont celles qui raisonnent à un horizon 20 ans. La projection des tendances de santé à cet horizon nécessite donc de compléter ces études par des essais à visée davantage prospective et de prendre des risques. Cette synthèse résume les problématiques déterminantes pour rendre compte de l'évolution de la santé dans les pays européens à l'horizon 2030. Cinq tendances ont été dégagées : vieillir jeune deviendra une priorité et un objectif partagés par tous les européens; le "risque santé" sera de plus en plus individualisé; Les patients seront au c?ur d'un écosystème élargi à de nouveaux acteurs; l'hôpital sera recentré sur les soins grâce à une diffusion massive des nouvelles technologies; La santé sera un vecteur de croissance pour l'économie européenne.

Borowitz, M. c. (2010). Value for Money in Health Spending, Paris : OCDE
http://www.oecd.org/document/0/0,3343,en_2649_33929_46141632_1_1_1_1,00.html - http://www.oecdbookshop.org/oecd/display.asp?sf1=identifiers&st1=812010142P1&LANG=FR

Health spending continues to rise inexorably, growing faster than the economy in most OECD countries. Most of this spending comes from the public purse. Given the recent economic downturn, countries are looking for ways to improve the efficiency of health spending. This publication examines current efforts to improve health care efficiency, including tools that show promise in helping health systems provide the best care for their money, such as pay for performance, co-ordination of care, health technology assessment and clinical guidelines, pharmaceutical reimbursement and risk-sharing agreements, and information and communication technology.

Di, Matteao, L. (2010). "The sustainability of public health expenditures : evidence from the Canadian Federation." European Journal of Health Economics (the) **11**(6): 569-584, 565 tabl.

The fiscal sustainability of government health expenditures is defined as the gap between growth rates of spending and measures of the resource base. The results show that over the period 1965-2008, real per capita Canadian provincial government health spending has grown at rates that exceed growth in basic measures of the resource base such as per capita gross domestic product (GDP), per capita federal transfers and per capita provincial government revenues. Forecasts of future spending to 2035 using determinant regression

and growth rate extrapolation techniques show that Canadian provincial government health spending is projected to continue rising in the future and its share of provincial GDP will rise. While the amount spent on health is ultimately a public policy choice, provincial government health spending also cannot continue growing faster than the resource base indefinitely.

FMI (2010). Macro-Fiscal Implications of Health Care Reform in Advanced and Emerging Economies. Washington Fonds Monétaire Internationale**:** 68.
https://www.imf.org/en/Publications/Policy-Papers/Issues/2016/12/31/Macro-Fiscal-Implications-of-Health-Care-Reform-in-Advanced-and-Emerging-Economies-PP4521

This paper provides an analysis of the developments in public health spending over the past 40 years, as well as projections of public health spending for 50 advanced and emerging countries over 2011–50. The paper also quantifies the effects of specific health reforms on the growth of public health spending in advanced economies by drawing on a range of analytical approaches, including country case studies. The challenges facing emerging economies as they seek to expand coverage of health care in a fiscally sustainable manner are also examined.

Przywara, B. (2010). Projecting future health care expenditure at European level: drivers, methodology and main results. Economic Papers; 417. Bruxelles Communauté Européenne**:** 83 , tabl., graph., annexes.
http://ec.europa.eu/economy_finance/publications/economic_paper/2010/pdf/ecp417_en.pdf

Predicting the future evolution of health care expenditure is one of crucial challenges facing the European Union and its Member States in the context of the demographic and social changes taking currently place in Europe. To correctly assess the risk of rising health care spending over the next couple of decades and establish adequate policy responses to the challenges, it is essential to devise a reliable method to estimate future health care expenditure. However, the complexity of the systems and multiplicity of factors affecting both total and public spending make this a highly complicated task, where results will always be surrounded by considerable uncertainties. To tackle this issue a major project was undertaken by the European Commission and Economic Policy Committee which aimed at projecting future public health care expenditure in twenty seven Member States of the European Union and Norway over the period 2007- 2060. A unique internationally comparable database has been established and a model built allowing to project health care spending in a common, coherent framework of macroeconomic variables and a set of projections covering a number of other age-related items of public social expenditure. The model incorporates the most recent developments in demography and epidemiology and draws on new insights from health economics, allowing the comparison of the risks and challenges facing both individual countries' health care systems and European society in its entirety. This paper provides a comprehensive overview of the theoretical background, practical aspects of projecting health care expenditure and the actual results of the projections undertaken in the context of long-term budgetary projections.

Scherer, P. et Devaux, M. (2010). The Challenge of Financing Health Care in the Current Crisis: An Analysis based on the OECD Data. OECD Health Working Paper; 49. Paris OCDE**:** 49 , tabl., fig., annexes.
http://www.olis.oecd.org/olis/2009doc.nsf/LinkTo/NT00009BEE/$FILE/JT03283971.PDF

La proportion des dépenses de santé par rapport au PIB, qui en termes macro-économiques est un indicateur récapitulant les besoins de financement d'un système de santé national, va probablement monter dans des pays où le PIB chute. Pendant les quatre dernières

décennies, les dépenses de santé ont augmenté dans la plupart des pays plus rapidement que le PIB, menant à une hausse de la proportion des dépenses. Des fluctuations dans cette proportion peuvent survenir à la suite de variations dans l?une ou l?autre de ses composantes. Dans quelques cas, notamment aux États-Unis, la variation du PIB est à l'origine même de la différence du ratio, mais dans la majorité des pays, les variations de dépense de santé sont plus importantes. L'expérience des pays qui ont vraiment réduit leurs dépenses de santé après des récessions laisse à penser que de telles réductions sont de courte durée et que la demande de résultats en matière de services de la santé signifie à la longue une reprise de la croissance des dépenses de santé.

Sisko, A. M., et al. (2010). "National Health Spending Projections: The Estimated Impact Of Reform Through 2019." Health Affairs **29**(10): 1933-1941.

This paper presents updated national health spending projections for 2009?2019 that take into account recent comprehensive health reform legislation and other relevant changes in law and regulations. Relative to our February 2010 projections under prior law, average annual growth in national health spending over the projection period is estimated to be 0.2 percentage point higher than our previous estimate. The health care share of gross domestic product (GDP) is expected to be 0.3 percentage point higher in 2019. Within these net overall impacts are larger differences for trends in spending and spending growth by payer, attributable to reform's many major changes to health care coverage and financing. Aux États-Unis, une étude gouvernementale, publiée sur le site Internet de la revue Health Affairs, montre que la réforme du système de soins n'aura aucun impact au niveau de la maîtrise des dépenses de santé jusqu'à au moins 2019 .A cette date, les États-Unis dépenseront annuellement 4 600 milliards de $ pour leur santé contre environ 2 600 milliards en 2010. Sans l'adoption de la réforme au printemps dernier, le total des dépenses de santé en 2019 s'élèverait à 4 500 milliards de $, estiment les auteurs de l'étude. Une hausse d'autant plus modérée que la réforme doit permettre d'assurer d'ici à 2019 une couverture santé à 92,7% de la population contre 84% actuellement.

Truffer, C. J., et al. (2010). "Health spending projections through 2019: the recession's impact continues." Health Aff (Millwood) **29**(3): 522-529.

The economic recession and rising unemployment-plus changing demographics and baby boomers aging into Medicare-are among the factors expected to influence health spending during 2009-2019. In 2009 the health share of gross domestic product (GDP) is expected to have increased 1.1 percentage points to 17.3 percent-the largest single-year increase since 1960. Average public spending growth rates for hospital, physician and clinical services, and prescription drugs are expected to exceed private spending growth in the first four years of the projections. As a result, public spending is projected to account for more than half of all U.S. health care spending by 2012.

2009

(2009). VA Health Care: Long-Term Care Strategic Planning and Budgeting Need Improvement. Washington GAO**:** 36 , fig.
http://www.gao.gov/new.items/d08808.pdf

In fiscal year 2007, the Department of Veterans Affairs (VA) spent about $4.1 billion on long-term care for veterans. VA provides?through VA or other providers'institutional care in nursing homes and non institutional care in veterans' homes or the community. In response

to a statute, VA published in 2007 a long-term care strategic plan through fiscal year 2013. VA includes long-term care spending estimates in its annual budget justifications for Congress. These estimates are based on workload projections?the amount of care to be provided'and cost assumptions. VA has discretion in allocating appropriated funds among its medical services, such as long-term care. GAO examined (1) VA's reporting of planned workload in its 2007 long-term care strategic plan and (2) VA?s long-term care spending estimates, including its cost assumptions and workload projections, in VA?s fiscal year 2009 budget justification. GAO analyzed budget and planning documents and interviewed VA. GAO recommends that VA add certain workload information to its next long-term care strategic plan, and use, in its budget justifications, assumptions and projections in line with recent experience, or report why not. VA supports GAO's conclusion that its long-term care strategic planning and budgeting should be clarified. VA did not comment on the recommendations, but said it will provide an action plan in response to the final report.

Bowen, J. D., et al. (2009). "Using a personal health care cost calculator to estimate future expenditures based on individual health risks." J Occup Environ Med **51**(4): 449-455.

OBJECTIVE: To describe the development and application of an innovative Health Improvement Cost Calculator tool designed to help individuals recognize the link between their current health risks, future medical costs, and productivity. METHODS: We describe how the Calculator was developed using data from studies that tie health care costs and productivity to population health risks, and how changes in risks are projected to reduce future spending for individual workers. RESULTS: Two simulations of the model illustrate how individuals may realize future economic costs or benefits depending on whether they maintain or change their health-risk profile. CONCLUSIONS: The Calculator has the potential to be a powerful motivational tool for individuals, especially those heading toward retirement, who are looking to understand the relationships between their health risks, future medical spending, and impacts on productivity.

Chernew, M. E., et al. (2009). "Increased spending on health care: long-term implications for the nation." Health Aff (Millwood) **28**(5): 1253-1255.

This paper updates one we published in 2003, describing the implications of continued health care spending growth for the consumption of non health goods and services. Our estimates now show that at approximately long-run average rates of excess health spending growth, 119 percent of the real increase in per capita income would be devoted to health spending over the 2007-2083 projection period. We argue that an alternative scenario, under which health spending grew just one percentage point faster than real per capita income, is "affordable," although 53.6 percent of real income growth over the period would go to health care. Moreover, even with the more favorable assumption, the nation would still face important challenges paying for care and dividing up the burden. This analysis thus supports the argument that reforms that would dramatically slow the rate of health care spending growth are necessary, especially if the nation hopes to maintain a reasonable amount of consumption of non health goods and services.

DeSalvo, K. B., et al. (2009). "Health care expenditure prediction with a single item, self-rated health measure." Med Care **47**(4): 440-447.

BACKGROUND: Prediction models that identify populations at risk for high health expenditures can guide the management and allocation of financial resources. OBJECTIVE: To compare the ability for identifying individuals at risk for high health expenditures between the single-item assessment of general self-rated health (GSRH), "In general, would you say

your health is Excellent, Very Good, Good, Fair, or Poor?," and 3 more complex measures. STUDY DESIGN: We used data from a prospective cohort, representative of the US civilian noninstitutionalized population, to compare the predictive ability of GSRH to: (1) the Short Form-12, (2) the Seattle Index of Comorbidity, and (3) the Diagnostic Cost-Related Groups/Hierarchal Condition Categories Relative-Risk Score. The outcomes were total, pharmacy, and office-based annualized expenditures in the top quintile, decile, and fifth percentile and any inpatient expenditures. DATA SOURCE: Medical Expenditure Panel Survey panels 8 (2003-2004, n = 7948) and 9 (2004-2005, n = 7921). RESULTS: The GSRH model predicted the top quintile of expenditures, as well as the SF-12, Seattle Index of Comorbidity, though not as well as the Diagnostic Cost-Related Groups/Hierarchal Condition Categories Relative-Risk Score: total expenditures [area under the curve (AUC): 0.79, 0.80, 0.74, and 0.84, respectively], pharmacy expenditures (AUC: 0.83, 0.83, 0.76, and 0.87, respectively), and office-based expenditures (AUC: 0.73, 0.74, 0.68, and 0.78, respectively), as well as any hospital inpatient expenditures (AUC: 0.74, 0.76, 0.72, and 0.78, respectively). Results were similar for the decile and fifth percentile expenditure cut-points. CONCLUSIONS: A simple model of GSRH and age robustly stratifies populations and predicts future health expenditures generally as well as more complex models.

Huang, E. S., et al. (2009). "Using clinical information to project federal health care spending." Health Aff (Millwood) **28**(5): w978-990.

Complications from chronic illnesses often do not emerge for many years. Current federal cost projection methods are constrained by ten-year cost estimates, which capture increases in near-term intervention costs but not changes in long-term costs. Current methods also cannot easily capture the cost implications of changes in disease progression. Type 2 diabetes is a prime example of a chronic illness with long-term health and cost consequences. We present results from an epidemiologically based model that projects federal costs for diabetes under alternative policies, and we discuss the potential changes in the federal budget process needed to capture the full impact of these interventions.

Michaud, P. C., et al. (2009). International Differences in Longevity and Health and their Economic Consequences. NBER Working Paper Series ; n° 15235. Cambridge NBER**:** 35 ,tabl., fig. http://www.nber.org/papers/w15235

In 1975, 50 year-old Americans could expect to live slightly longer than their European counterparts. By 2005, American life expectancy at that age has diverged substantially compared to Europe. We find that this growing longevity gap is primarily the symptom of real declines in the health of near-elderly Americans, relative to their European peers. In particular, we use a microsimulation approach to project what US longevity would look like, if US health trends approximated those in Europe. We find that differences in health can explain most of the growing gap in remaining life expectancy. In addition, we quantify the public finance consequences of this deterioration in health. The model predicts that gradually moving American cohorts to the health status enjoyed by Europeans could save up to $1.1 trillion in discounted total health expenditures from 2004 to 2050.

Michaud, P. C., et al. (2009). Understanding the Economic Consequences of Shifting Trends in Population Health. NBER Working Paper Series ; n° 15231. Cambridge NBER**:** 41 ,tabl., fig. http://www.nber.org/papers/w15231

The public economic burden of shifting trends in population health remains uncertain. Sustained increases in obesity, diabetes, and other diseases could reduce life expectancy - with a concomitant decrease in the public-sector's annuity burden - but these savings may be

offset by worsening functional status, which increases health care spending, reduces labor supply, and increases public assistance. Using a microsimulation approach, we quantify the competing public-finance consequences of shifting trends in population health for medical care costs, labor supply, earnings, wealth, tax revenues, and government expenditures (including Social Security and income assistance). Together, the reduction in smoking and the rise in obesity have increased net public-sector liabilities by $430bn, or approximately 4% of the current debt burden. Larger effects are observed for specific public programs: annual spending is 10% higher in the Medicaid program, and 7% higher for Medicare.

Sisko, A., et al. (2009). "Health spending projections through 2018: recession effects add uncertainty to the outlook." Health Aff (Millwood) **28**(2): w346-357.

During the projection period (2008-2018), average annual growth in national health spending is projected to be 6.2 percent-2.1 percentage points faster than average annual growth in gross domestic product (GDP). The health share of GDP is anticipated to rise rapidly from 16.2 percent in 2007 to 17.6 percent in 2009, largely as a result of the recession, and then climb to 20.3 percent by 2018. Public payers are expected to become the largest source of funding for health care in 2016 and are projected to pay for more than half of all national health spending in 2018.

Van Meijgaard, J., et al. (2009). "Assessing and forecasting population health: integrating knowledge and beliefs in a comprehensive framework." Public Health Rep **124**(6): 778-789.

A comprehensive population health-forecasting model has the potential to interject new and valuable information about the future health status of the population based on current conditions, socioeconomic and demographic trends, and potential changes in policies and programs. Our Health Forecasting Model uses a continuous-time microsimulation framework to simulate individuals' lifetime histories by using birth, risk exposures, disease incidence, and death rates to mark changes in the state of the individual. The model generates a reference forecast of future health in California, including details on physical activity, obesity, coronary heart disease, all-cause mortality, and medical expenditures. We use the model to answer specific research questions, inform debate on important policy issues in public health, support community advocacy, and provide analysis on the long-term impact of proposed changes in policies and programs, thus informing stakeholders at all levels and supporting decisions that can improve the health of populations.

2008

Begg, S., et al. (2008). "An alternative approach to projecting health expenditure in Australia." Aust Health Rev **32**(1): 148-155.

OBJECTIVE: To introduce a large body of work that explores the modelling of expenditure on health services per person living with major causes of disease or injury as a valid basis for conclusions regarding future health expenditure in Australia. METHODS: Separate projections were calculated for important health conditions (or groups of conditions) by type of expenditure (hospital care, medical services, pharmaceuticals, aged care homes and other health services). Analyses accounted for expected changes in the number of affected cases, the proportion of cases treated, the volume of health services per treated case and excess health price inflation. RESULTS: Total health expenditure in Australia is expected to increase from 9.4% of GDP in 2002-03 to 10.8% of GDP in 2032-33. This represents a 15% increase in the "health : GDP" proportion over the projection period, or an annual growth of 0.5%. Two-

thirds of this growth is accounted for by expected increases in population size and population ageing. CONCLUSIONS: The lower annual growth in the "health : GDP" proportion compared with other estimates for Australia (range, 0.9% to 1.7%) was attributed to different assumptions regarding non-demographic growth factors, particularly volume per case. Explicit modelling of these factors separately for each condition ensured that assumptions remained within plausible limits.

Borger, C., et al. (2008). "Projecting long term medical spending growth." J Health Econ **27**(1): 69-88.

We present a dynamic general equilibrium model of the U.S. economy and the medical sector in which the adoption of new medical treatments is endogenous and the demand for medical services is conditional on the state of technology. We use this model to prepare 75-year medical spending forecasts and a projection of the Medicare actuarial balance, and we compare our results to those obtained from a method that has been used by government actuaries. Our baseline forecast predicts slower health spending growth in the long run and a lower Medicare actuarial deficit relative to the previous projection methodology.

Fogel, R. W. (2008). Forecasting the cost of U.S Health Care in 2040. NBER Working Paper Series ; n° 14361. Cambridge NBER**:** 16, fig.
http://www.nber.org/papers/w14361

One of the most important debates among health economists in rich nations is whether advances in biotechnology will spare their health care systems from a financial crisis. We must consider that prevalence rates of chronic diseases declined during the twentieth century and that this rate of decline has accelerated. However, health care costs may continue to increase even as the age of onset of chronic diseases is delayed, because the proportion of a cohort living to late ages will increase. The accelerating decline in the prevalence of chronic diseases during the course of the twentieth century supports the proposition that increases in life expectancy during the twenty-first century will be fairly large, but the effect on health care in the U.S. will be modest. The income elasticity for health services is calculated at 1.6, meaning that income expenditures on health care in the U.S. are likely to rise from a current level of about 15 percent to about 29 percent of GDP in 2040.

Gandjour, A., et al. (2008). "[Impact of demographic changes on health care expenditure in Germany: an analysis considering the expenditures of decedents]." Gesundheitswesen **70**(2): 77-80.

The purpose of this study was to evaluate the impact of demographic changes on future health care expenditure of the German social health insurances considering the expenditures of survivors and decedents by age. The study analysed data from 269,646 members up to the age of 99 years of the AOK - one of Germany's largest social health insurers - in the State of Hesse in 2000/2001. In order to determine future health care expenditures, per-capita expenditures by age for outpatient, inpatient, rehabilitation, and nursing services of survivors and decedents (death within the next 12 months) were multiplied by the estimated number of survivors and decedents by age in Germany in 2020, 2035 und 2050. Expenditures for all ages were summed together. The paper shows that demographic changes until 2050 will lead to an increase of health care expenditures by 20% in total or less than 1% annually. Considering the future re-duction in workforce, demographic changes until 2050 will result in an estimated increase in health care expenditures per employee by about 57% (undifferentiated model). Considering the cost of survivors and decedents separately, this increase will amount to 50%. Hence, undifferentiated models overestimate the impact of demographic changes by about 10%.

McCrone, P., et al. (2008). Paying the Price: The cost of mental health care in England to 2026. Londres King's Fund Institute**:** 143 , tabl., fig., annexes.
http://www.kingsfund.org.uk/document.rm?id=7665

Recognising the significance of mental health in terms of both the health of the population and the cost to the government and taxpayer, in 2006 the King's Fund commissioned a review to estimate mental health expenditure in England for the next 20 years, to 2026. The review had the following broad aims. It assesses the current need for mental health services and the costs of services provided; projects needs and costs to the year 2026; assesses the impact that specific interventions may have on these costs.

Willeme, P. (2008). Estimating private health expenditures within a dynamic consumption allocation model. Bruxelles Bureau Fédéral du Plan**:** 24 , fig., tabl.
http://www.plan.be/admin/uploaded/200802181346360.wp200804.pdf

This paper presents a model of Belgian household consumption, with a focus on private health expenditures. To do so, we have formulated and estimated an extension of the classic Almost Ideal Demand System. The original model has been modified by introducing a dynamic adjustment mechanism and by the inclusion of demographic variables. These were expected to capture shifts in consumption patterns related to the changing age composition of the population. The results confirm the expected effects : the ageing of the population is likely to increase the share of private health expenditures (and consumer durables) in the household

2007-2001

Andrews, D. (2007). Assessing alternative financing methods for the Canadian Health Care System in view of population aging. SEDAP Research Paper ; n°224. Hamilton SEDAP**:** 46 , 45 tabl.
http://socserv.socsci.mcmaster.ca/sedap/p/sedap224.pdf

Le coût du système de santé représente 10% du Produit Intérieur Brut (PIB) canadien. De récents sondages montrent que les citoyens ne sont pas en faveur d'une augmentation du budget de la santé mais sont toutefois de l'avis que le système en place devrait être en mesure d'assurer un service de meilleure qualité. En raison du faible taux de natalité et de l'augmentation de l'espérance de vie, la population canadienne est vieillissante. Au cours des 25 prochaines années, le ratio de dépendance des personnes âgées va augmenter, principalement en raison du vieillissement de la génération des babyboomers. Cette situation va placer une double pression budgétaire sur les gouvernements responsables du maintien du système de santé public. L'augmentation de l'espérance de vie moyenne des canadiens va amener ceux-ci à bénéficier plus longtemps du système de santé. Même si, pour un âge donné, la consommation du service n'augmente pas, le vieillissement entraînera l'augmentation des dépenses totales annuelles en santé. Le ratio de dépendance est un indicateur de la capacité de la population à supporter le système. Le taux de dépendance grandissant pourrait résulter en un ralentissement de la croissance du PIB, en supposant un niveau de technologie constant. La première section de cet article tente de quantifier ces facteurs. Une mesure unique combinant les coûts et la qualité est développée dans le but de démontrer l'ampleur du défi à relever. La seconde section de cet article examine différentes approches de financement du système de santé, incluant des frais d'utilisation et des méthodes alternatives de compensation des médecins. Cet article présente les informations documentées pertinentes des expériences canadiennes et internationales décrivant les

problèmes liés à la mise en place de ces différentes mesures. Cet article évalue l'intérêt d'implanter ces dernières au Canada.

Costa-Font, J., et al. (2007). How does demography affect long-term care expenditures projections ? Evidence of four european Union member states. Madrid FEDEA**:** 31 , tabl. http://www.fedea.es/pub/eee231.pdf

This study examines the sensitivity of future long-term-care demand and expenditure estimates to official demographic projections in four selected European countries: Germany, Spain, Italy and the United Kingdom. It uses standardised methodology in the form of a macro-simulation exercise and finds evidence for significant differences in assumptions about demographic change and its effect on the demand for long-term care, and on relative and absolute long-term care expenditure. It concludes that mortality-rate assumptions can have a considerable influence on welfare policy planning. Relative dispersion between country-specific and Eurostat official estimates was found to be higher for the United Kingdom and Germany than for Italy and Spain, suggesting that demographic projections had a greater influence in those countries.

Hakkinen, U., et al. (2007). Aging, Health Expenditure, Proximity of Death and Income in Finland. Discussion Papers; 1/2007. Helsinki STAKES**:** 27.

The study revisited the debate on the 'red herring" i.e. the claim that population aging will not have a significant impact on health care expenditure (HCE), using a Finnish data set. We decompose HCE into several components and include both survivors and deceased individuals into the analyses. We also compare the predictions of health expenditure based on a model that takes into account the proximity of death with the predictions of a naive model, which includes only age and gender and their interactions. We extend our analysis to include income as an explanatory variable. According to our results, total expenditure on health care and care of elderly people increases with age but the relationship is not as clear as is usually assumed when a naive model is used in health expenditure projections. Among individuals not in long-term care we found a clear positive relationship between expenditure and age only for health centre and psychiatric inpatient care. In somatic care and prescribed drugs, the expenditure clearly decreased with age among deceased individuals. Our results emphasise that even in the future, health care expenditure might be driven more by changes in the propensity to move into long-term care and medical technology than age and gender alone as often claimed in public discussion. Thus the future expenditure is more likely to be determined by health policy actions than inevitable trends in the demographic composition of the population.

Khoman, E. et Weale, M. (2007). Development of Scenarios for Health and Long-Term Care Expenditure in the European Union Member States. ENEPRI Research Report; 42. Bruxelles ENEPRI**:** 117 , tabl., annexes.

Over the next fifty years, the size and age structure of Europe's population will experience major changes due to low fertility rates, continuous increases in life expectancy due to medical advances and the retirement of the baby boom generation. The main output of this work package is a model which allows the construction of scenarios for health and long-term care expenditure based on the premise that health spending is driven by a number of demographic, economic, social and institutional variables. The projections computed in this study are not forecasts but are instead intended to provide an indication on the potential timing and scale of budgetary challenges that could result from Europe's ageing population.

(2006). The impact of ageing on public expenditure : projections for the EU-25 Member States on pensions, healthcare, long-term care, education and unemployment tranfers (2004-50). Luxembourg Office des Publications officielles de la Communauté européenne**:** 199 , tabl.
http://ec.europa.eu/economy_finance/publications/publication6654_en.pdf

This report provides a detailed description of the projections on age-related expenditure covering pensions, health care, long-term care, education and unemployment transfers for EU25 Member States for the period 2004 to 2050. The projections, prepared by the European Commission (Directorate General for Economic and Financial Affairs) and the EPC's Working Group on Ageing Populations on the basis of commonly agreed assumptions, describe in detail the potential economic impact and the timing and scale of budgetary changes that could result from ageing populations. These projections provide a comprehensive and comparable basis for assessing further in depth the log-term sustainability of Member States'public finances within the framework of the reformed Stability and Growth Pact.

Oliveira, Martins, De Lamaisonneuve, C. (2006). The drivers of public expenditure on health and long-term care : an integrated approach. OECD Economic Studies ; 43. Paris OCDE**:** 115-154 , fig., tabl., ann.

This paper proposes a framework for projecting public health and long-term care expenditures. It considers demographic and other (non-demographic) drivers of expenditures. The paper extends demographic drivers by incorporating death-related costs and the health status of the population. Concerning health care, the projections incorporate income and the effects of technology cum relative prices. For long-term care, the effects of increased labour participation, reduction of informal care and Baumol's cost disease are taken into account. Using this integrated approach, public health and long-term care expenditures are projected for all OECD countries. Alternative scenarios are simulated, together with sensitivity analysis. Depending on the scenarios, total public OECD health and long-term care spending is projected to increase in the range of 3.5 to 6 percentage points of GDP for the period 2005-2050.

(2005). The 2005 projection of age-related expenditure (2004-50) for the EU-25 member states : underlying assumptions and projection methodologies. Special report; 4. Luxembourg Office des publications officielles des Communautés européenne.**:** 207 , graph., tabl., ann.
http://ec.europa.eu/economy_finance/publications/european_economy/2005/eesp405en.pdf

In 2003, the ECOFIN Council gave the Economic Policy Committee (EPC) a mandate to produce a new set of long-run budgetary projections for all twenty-five Member States covering pensions, health care, long-term care, education, unemployment transfers and, if possible, contributions to pensions/social security systems. This follows the projection exercises of 2001 and 2003. The age-related expenditure projections feed into a variety of policy debates at EU level. In particular, they are used in the annual assessment of the sustainability of public finances carried out as part of the Stability and Growth Pact; in the context of the Open-Method of Co-ordination on pensions; and the analysis on the impact of ageing populations on the labour market and potential growth which will be relevant for the Lisbon strategy and Broad Economic Policy Guidelines. This report provides a description of underlying assumptions, projection methodologies and background analysis of the age-related expenditure projections. Final results will be calculated on the basis the described methodology and will be presented to the Ecofin Council in February 2006.

Hall, R. E. et Jones, C. I. (2005). The value of life and the rise in Health spending. NBER Working Paper

Series ; n° 10737. Cambridge NBER**:** 42 , tabl., graph., fig., ann.
http://www.nber.org/papers/w10737.pdf

Health care extends life. Over the past half century, Americans have spent a rising share of total economic resources on health and have enjoyed substantially longer lives as a result. Debate on health policy often focuses on limiting the growth of health spending. We investigate an issue central to this debate: can we understand the growth of health spending as the rational response to changing economic conditions - notably the growth of income per person ? We estimate parameters of the technology that relates health spending to improved health, measured as increased longevity. We also estimate parameters of social preferences about longevity and the consumption of nonhealth goods and services. The story of rising health spending that emerges is that the diminishing marginal utility of non-health consumption combined with a rising value of life causes the nation to move up the marginal-cost schedule of life extension. The health share continues to grow as long as income grows. In projections based on our parameter estimates, the health share reaches 33 percent by the middle of the century.

Peelikaan, F. et Westerhout, E. (2005). Alternative scenarios for health, life expectancy and social expenditure. The influence of living longer in better health on health care and pension expenditures and government finances in the UE. ENEPRI Research Report; 8. Bruxelles ENEPRI**:** 104 , fig., tabl., annexe.
http://www.enepri.org/Publications/RR08.pdf

This report investigates the effect of population ageing on public health - and long-term care expenditures, public pensions and government finances in EU countries in the projection period 2002-50. The authors specifically consider new insights about the development of demography and health on these projections. In this regard, the view has been expressed that people may live substantially longer in the future than estimated by current demographic projections and may spend part of these additional years in better health. Both developments have obvious implications for the correct projection of public expenditures and finances. To assess the effects of living longer in better health, four core scenarios are developed: a base case and scenarios for living longer, living in better health and living longer in better health. The analysis also contains a number of new elements. First, it includes the costs incurred during the last years of life in the projections, which will be postponed by an increase in life expectancy. Hence, the calculations in the study correct for the overestimation of future healthcare expenditure that arises when no account is made for mortality-related costs. Second, the cost of mortality is disaggregated into a health- and long-term care component, which differs by age. Third, tax revenues are incorporated into the projections for government finances. With this information, the analysis is able to project government finances in the future and assess whether government finances are sustainable under current social policy rules.

Steinmann, L., et al. (2005). The impact of aging on future healthcare expenditure. Working Paper ; n° 0510. Zurich Socioeconomic Institute**:** 23.

The impact of aging on healthcare expenditure (HCE) has been at the center of a prolonged debate. This paper purports to shed light on several issues. First, it presents new evidence on the relative importance of the two components of HCE that have been distinguished by Zweifel, Felder and Meier (1999), viz. the cost of morbidity and the cost of mortality (their "red herring" hypothesis claims that neglecting the mortality component results in excessive estimates of future growth of HCE). Second, it takes account of recent evidence suggesting that HCE does increase life expectancy, implying that time-to-death is an endogenous

determinant of HCE. Third, it investigates the contribution of population aging to the future growth of HCE. For the case of Switzerland, it finds this contribution to be relatively small regardless of whether or not the cost of dying is accounted for, thus qualifying the "red herring" hypothesis (résumé d'auteur).

Comas-Herrera, A., et al. (2003). European Study of long-term care expenditures : investigating the sensitivity of projections of future long-term care expenditure in Germany, Spain, Italy and the United Kingdom to changes in assumptions about demography, dependency, informal care, formal care and unit costs. PSSRU Discussion paper ; n° 1840. Londres LSE**:** 233 , tabl.

Long-term care services are crucial to the welfare of older people. As the numbers of older people rise throughout Europe, the importance of these services in terms of numbers of clients and expenditures can be expected to grow. The study of long term care services, including their financing, is an important means to promote better understanding of key issues and ultimately better outcomes. There has been recent debate in several countries about the funding of long term care. This is in the context of concerns about the future affordability of long-term care, as well as health care, pensions and other services, over the coming decades. These concerns arise from consideration of demographic trends, potentially declining family support for frail older people, and potentially rising expectations among older people. In this context, the European Union's Economic Policy Committee (EPC) conducted a study of the impact of ageing on future public expenditure on pensions, health and long-term care and how it would affect the fiscal sustainability of public finances (Economic Policy Committee, 2001). This new European Study of Long-Term Care Expenditure investigated the key factors that are likely to affect future expenditure on long-term care services in Germany, Spain, Italy and the United Kingdom. The aim was to investigate how sensitive long-term care projections are to assumptions about future trends in different factors, using comparable projection models. The main factors investigated include demographic changes, trends in functional dependency, future availability of informal care, the structure of formal care services and patterns of provision, and the future unit costs of services. Part One of this report contains a description of the long-term care systems for each of Germany, Spain, Italy and the UK. Part Two describes the projection models and presents the base projections for each country. Part Three investigates the sensitivity of the projections to different assumptions.

Hogan, S. et Hogan, S. (2002). How will the ageing of the population affect Health Care needs and costs in the foreseeable future ? Discussion Paper ; 25.**:** 22.

Cette étude analyse l'impact du vieillissement démographique sur les besoins et les dépenses de santé au Canada. Les projections portent jusqu'en 2060.

Lee, R. et Miller, T. (2002). "An approach to forecasting health expenditures, with application to the U.S. Medicare system." Health Serv Res **37**(5): 1365-1386.

OBJECTIVE: To quantify uncertainty in forecasts of health expenditures. STUDY DESIGN: Stochastic time series models are estimated for historical variations in fertility, mortality, and health spending per capita in the United States, and used to generate stochastic simulations of the growth of Medicare expenditures. Individual health spending is modeled to depend on the number of years until death. DATA SOURCES/STUDY SETTING: A simple accounting model is developed for forecasting health expenditures, using the U.S. Medicare system as an example. PRINCIPAL FINDINGS: Medicare expenditures are projected to rise from 2.2 percent of GDP (gross domestic product) to about 8 percent of GDP by 2075. This increase is due in equal measure to increasing health spending per beneficiary and to population aging. The

traditional projection method constructs high, medium, and low scenarios to assess uncertainty, an approach that has many problems. Using stochastic forecasting, we find a 95 percent probability that Medicare spending in 2075 will fall between 4 percent and 18 percent of GDP, indicating a wide band of uncertainty. Although there is substantial uncertainty about future mortality decline, it contributed little to uncertainty about future Medicare spending, since lower mortality both raises the number of elderly, tending to raise spending, and is associated with improved health of the elderly, tending to reduce spending. Uncertainty about fertility, by contrast, leads to great uncertainty about the future size of the labor force, and therefore adds importantly to uncertainty about the health-share of GDP. In the shorter term, the major source of uncertainty is health spending per capita. CONCLUSIONS: History is a valuable guide for quantifying our uncertainty about future health expenditures. The probabilistic model we present has several advantages over the high-low scenario approach to forecasting. It indicates great uncertainty about future Medicare expenditures relative to GDP.

Busse, R. (2001). "Expenditure on health care in the EU : making projections for the future based on past." Hepac : Health Economics in Prevention and Care **2**(4): 158-161.

Les dépenses de santé des pays de l'Union européenne ont considérablement augmenté depuis les années 1970. Les facteurs habituellement invoqués sont d'ordre : démographique (vieillissement de la population), économique (croissance), technologique (progrès médical et innovation technologique), organisationnel (systèmes de santé de type bismarkien versus Beveridge, principalement). Si le vieillissement de la population est souvent surestimé, le progrès médical va continuer d'exercer son impact sur les dépenses de santé. Cet article tente des projections sur les trente années à venir.

Dépenses de santé et produit intérieur brut

2020

Rana, R. H., Alam, K. et Gow, J. (2020). "Health expenditure and gross domestic product: causality analysis by income level." Int J Health Econ Manag **20**(1): 55-77.

The empirical findings on the relationship between gross domestic product (GDP) and health expenditure are diverse. The influence of income levels on this causal relationship is unclear. This study examines if the direction of causality and income elasticity of health expenditure varies with income level. It uses the 1995-2014 panel data of 161 countries divided into four income groups. Unit root, cointegration and causality tests were employed to examine the relationship between GDP and health expenditure. Impulse-response functions and forecast-error variance decomposition tests were conducted to measure the responsiveness of health expenditure to changes in GDP. Finally, the common correlated effects mean group method was used to examine the income elasticity of health expenditure. Findings show that no long-term cointegration exists, and the growth in health expenditure and GDP across income levels has a different causal relationship when cross-sectional dependence in the panel is accounted for. About 43% of the variation in global health expenditure growth can be explained by economic growth. Income shocks affect health expenditure of high-income countries more than lower-income countries. Lastly, the income elasticity of health expenditure is less than one for all income levels. Therefore, healthcare is a necessity. In comparison with markets, governments have greater obligation to provide essential health care services. Such results have noticeable policy implications, especially for low-income

countries where GDP growth does not cause increased health expenditure.

2019

Rodriguez, A. F. et Nieves Valdes, M. (2019). "Health care expenditures and GDP in Latin American and OECD countries: a comparison using a panel cointegration approach." Int J Health Econ Manag **19**(2): 115-153.

This paper provides empirical evidence of the existence of a long-run causal relationship between GDP and health care expenditures, for a group of Latin American and the Caribbean countries and for OECD countries for the period 1995-2014. We estimated the income elasticity of health expenditure to be equal to unity for both groups of countries, that is, health care in Latin American and OECD countries is a necessity rather than a luxury. We did not find evidence of a causal effect in the opposite direction, i.e. from changes in health expenditure to GDP. We present conclusive evidence of the cross-country dependence of the analyzed series, and consequently we used panel unit root tests, panel cointegration tests, and long-run estimates that are robust to such dependence. Specifically, we use the CIPS panel unit root test and the panel Common Correlated Effects estimator. We also show that the results obtained by mistakenly using methods that assume cross-section independence are unstable.

2018

Dunn, A., Grosse, S. D. et Zuvekas, S. H. (2018). "Adjusting Health Expenditures for Inflation: A Review of Measures for Health Services Research in the United States." Health Serv Res **53**(1): 175-196.

OBJECTIVE: To provide guidance on selecting the most appropriate price index for adjusting health expenditures or costs for inflation. DATA SOURCES: Major price index series produced by federal statistical agencies. STUDY DESIGN: We compare the key characteristics of each index and develop suggestions on specific indexes to use in many common situations and general guidance in others. DATA COLLECTION/EXTRACTION METHODS: Price series and methodological documentation were downloaded from federal websites and supplemented with literature scans. PRINCIPAL FINDINGS: The gross domestic product implicit price deflator or the overall Personal Consumption Expenditures (PCE) index is preferable to the Consumer Price Index (CPI-U) to adjust for general inflation, in most cases. The Personal Health Care (PHC) index or the PCE health-by-function index is generally preferred to adjust total medical expenditures for inflation. The CPI medical care index is preferred for the adjustment of consumer out-of-pocket expenditures for inflation. A new, experimental disease-specific Medical Care Expenditure Index is now available to adjust payments for disease treatment episodes. CONCLUSIONS: There is no single gold standard for adjusting health expenditures for inflation. Our discussion of best practices can help researchers select the index best suited to their study.

Tian, F., Gao, J. et Yang, K. (2018). "A quantile regression approach to panel data analysis of health-care expenditure in Organisation for Economic Co-operation and Development countries." Health Econ **27**(12): 1921-1944.

This paper investigates the variation in the effects of various determinants on the per capita health-care expenditure. A total of 28 Organisation for Economic Co-operation and

Development countries are studied over the period 1990-2012, employing an instrumental variable quantile regression method for a dynamic panel model with fixed effects. The results show that the determinants of per capita health-care expenditure growth, involving the growth of lagged health spending, of per capita gross domestic product (GDP), of physician density, of elderly population, of life expectancy, of urbanization, and of female labor force participation, do vary with the conditional distribution of the health-care expenditure growth, while the changing patterns are dissimilar. Moreover, we show that Baumol's model of "unbalanced growth" has a significantly positive effect on per capita health spending growth, and its effect is quite stable over the entire distribution. However, the correlation between the components (wage growth and labor productivity growth) of the "Baumol variable" and health expenditure growth is more varied. As a comparison, only the growth of lagged health spending, per capita GDP, and the Baumol variable (or its components) are found related to health spending growth in conditional mean regressions. The prediction results were also quite different between the quantile regression dynamic panel instrumental variable models and linear panel data models. More attention needs to be paid to the varying influence of determinants in health expenditure study.

2017

(2017). "Future and potential spending on health 2015-40: development assistance for health, and government, prepaid private, and out-of-pocket health spending in 184 countries." Lancet **389**(10083): 2005-2030.

BACKGROUND: The amount of resources, particularly prepaid resources, available for health can affect access to health care and health outcomes. Although health spending tends to increase with economic development, tremendous variation exists among health financing systems. Estimates of future spending can be beneficial for policy makers and planners, and can identify financing gaps. In this study, we estimate future gross domestic product (GDP), all-sector government spending, and health spending disaggregated by source, and we compare expected future spending to potential future spending. METHODS: We extracted GDP, government spending in 184 countries from 1980-2015, and health spend data from 1995-2014. We used a series of ensemble models to estimate future GDP, all-sector government spending, development assistance for health, and government, out-of-pocket, and prepaid private health spending through 2040. We used frontier analyses to identify patterns exhibited by the countries that dedicate the most funding to health, and used these frontiers to estimate potential health spending for each low-income or middle-income country. All estimates are inflation and purchasing power adjusted. FINDINGS: We estimated that global spending on health will increase from US$9.21 trillion in 2014 to $24.24 trillion (uncertainty interval [UI] 20.47-29.72) in 2040. We expect per capita health spending to increase fastest in upper-middle-income countries, at 5.3% (UI 4.1-6.8) per year. This growth is driven by continued growth in GDP, government spending, and government health spending. Lower-middle income countries are expected to grow at 4.2% (3.8-4.9). High-income countries are expected to grow at 2.1% (UI 1.8-2.4) and low-income countries are expected to grow at 1.8% (1.0-2.8). Despite this growth, health spending per capita in low-income countries is expected to remain low, at $154 (UI 133-181) per capita in 2030 and $195 (157-258) per capita in 2040. Increases in national health spending to reach the level of the countries who spend the most on health, relative to their level of economic development, would mean $321 (157-258) per capita was available for health in 2040 in low-income countries. INTERPRETATION: Health spending is associated with economic development but past trends and relationships suggest that spending will remain variable, and low in some low-resource settings. Policy change could lead to increased health

spending, although for the poorest countries external support might remain essential. FUNDING: Bill & Melinda Gates Foundation.

Atilgan, E., Kilic, D. et Ertugrul, H. M. (2017). "The dynamic relationship between health expenditure and economic growth: is the health-led growth hypothesis valid for Turkey?" Eur J Health Econ **18**(5): 567-574.

The well-known health-led growth hypothesis claims a positive correlation between health expenditure and economic growth. The aim of this paper is to empirically investigate the health-led growth hypothesis for the Turkish economy. The bound test approach, autoregressive-distributed lag approach (ARDL) and Kalman filter modeling are employed for the 1975-2013 period to examine the co-integration relationship between economic growth and health expenditure. The ARDL model is employed in order to investigate the long-term and short-term static relationship between health expenditure and economic growth. The results show that a 1 % increase in per-capita health expenditure will lead to a 0.434 % increase in per-capita gross domestic product. These findings are also supported by the Kalman filter model's results. Our findings show that the health-led growth hypothesis is supported for Turkey.

Baltagi, B. H., Lagravinese, R., Moscone, F., et al. (2017). "Health Care Expenditure and Income: A Global Perspective." Health Econ **26**(7): 863-874.

This paper investigates the long-run economic relationship between healthcare expenditure and income in the world using data on 167 countries over the period 1995-2012, collected from the World Bank data set. The analysis is carried using panel data methods that allow one to account for unobserved heterogeneity, temporal persistence, and cross-section dependence in the form of either a common factor model or a spatial process. We estimate a global measure of income elasticity using all countries in the sample, and for sub-groups of countries, depending on their geo-political area and income. Our findings suggest that at the global level, health care is a necessity rather than a luxury. However, results vary greatly depending on the sub-sample analysed. Our findings seem to suggest that size of income elasticity depends on the position of different countries in the global income distribution, with poorer countries showing higher elasticity. Copyright (c) 2016 John Wiley & Sons, Ltd.

Keehan, S. P., Stone, D. A., Poisal, J. A., et al. (2017). "National Health Expenditure Projections, 2016-25: Price Increases, Aging Push Sector To 20 Percent Of Economy." Health Aff (Millwood) **36**(3): 553-563.

Under current law, national health expenditures are projected to grow at an average annual rate of 5.6 percent for 2016-25 and represent 19.9 percent of gross domestic product by 2025. For 2016, national health expenditure growth is anticipated to have slowed 1.1 percentage points to 4.8 percent, as a result of slower Medicaid and prescription drug spending growth. For the rest of the projection period, faster projected growth in medical prices is partly offset by slower projected growth in the use and intensity of medical goods and services, relative to that observed in 2014-16 associated with the Affordable Care Act coverage expansions. The insured share of the population is projected to increase from 90.9 percent in 2015 to 91.5 percent by 2025.

Martin, A. B., Hartman, M., Washington, B., et al. (2017). "National Health Spending: Faster Growth In 2015 As Coverage Expands And Utilization Increases." Health Aff (Millwood) **36**(1): 166-176.

Total nominal US health care spending increased 5.8 percent and reached $3.2 trillion in 2015. On a per person basis, spending on health care increased 5.0 percent, reaching $9,990. The share of gross domestic product devoted to health care spending was 17.8 percent in 2015, up from 17.4 percent in 2014. Coverage expansions that began in 2014 as a result of the Affordable Care Act continued to affect health spending growth in 2015. In that year, the faster growth in total health care spending was primarily due to accelerated growth in spending for private health insurance (growth of 7.2 percent), hospital care (5.6 percent), and physician and clinical services (6.3 percent). Continued strong growth in Medicaid (9.7 percent) and retail prescription drug spending (9.0 percent), albeit at a slower rate than in 2014, contributed to overall health care spending growth in 2015.

2016

Atilgan, E., et al. (2016). "The dynamic relationship between health expenditure and economic growth: is the health-led growth hypothesis valid for Turkey?" Eur J Health Econ.

The well-known health-led growth hypothesis claims a positive correlation between health expenditure and economic growth. The aim of this paper is to empirically investigate the health-led growth hypothesis for the Turkish economy. The bound test approach, autoregressive-distributed lag approach (ARDL) and Kalman filter modeling are employed for the 1975-2013 period to examine the co-integration relationship between economic growth and health expenditure. The ARDL model is employed in order to investigate the long-term and short-term static relationship between health expenditure and economic growth. The results show that a 1 % increase in per-capita health expenditure will lead to a 0.434 % increase in per-capita gross domestic product. These findings are also supported by the Kalman filter model's results. Our findings show that the health-led growth hypothesis is supported for Turkey.

Chahoud, J., et al. (2016). "Wealth, Health Expenditure, and Cancer: A National Perspective." J Natl Compr Canc Netw **14**(8): 972-978.

BACKGROUND: The US health care system is characterized by high health expenditures with penultimate outcomes. This ecological study evaluates the associations between wealth, health expenditure, and cancer outcomes at the state level. METHODS: We extracted gross domestic product (GDP) and health expenditure per capita from the 2009 Bureau of Economic Analysis and the Centers for Medicare & Medicaid Services, respectively. Using data from the NCI, we retrieved colorectal cancer (CRC), breast cancer, and all-cancer age-adjusted rates and computed mortality/incidence (M/I) ratios. We used the Spearman's rank correlation to determine the association between the financial indicators and cancer outcomes, and we constructed geographic distribution maps to describe these associations. RESULTS: GDP per capita significantly correlated with lower M/I ratios for all cancers, breast cancer, and CRC. As for health expenditure per capita, preliminary analysis highlighted a rift between the Northeastern and Southern states, which translated into worse breast and all-cancer outcomes in Southern states. Further analysis showed that higher health expenditure significantly correlated with decreased breast cancer M/I ratio. However, CRC outcomes were not significantly affected by health expenditure, nor were all-cancer outcomes. CONCLUSIONS: All cancers, breast cancer, and CRC outcomes significantly correlated with wealth, whereas only breast cancer correlated with higher health expenditure. Future research is needed to evaluate the potential role of policies in optimizing resource allocation in the states' efforts against CRC and minimizing disparities in interstate cancer outcomes.

Himmelstein, D. U. et Woolhandler, S. (2016). "The Current and Projected Taxpayer Shares of US Health Costs." Am J Public Health **106**(3): 449-452.

OBJECTIVES: We estimated taxpayers' current and projected share of US health expenditures, including government payments for public employees' health benefits as well as tax subsidies to private health spending. METHODS: We tabulated official Centers for Medicare and Medicaid Services figures on direct government spending for health programs and public employees' health benefits for 2013, and projected figures through 2024. We calculated the value of tax subsidies for private spending from official federal budget documents and figures for state and local tax collections. RESULTS: Tax-funded health expenditures totaled $1.877 trillion in 2013 and are projected to increase to $3.642 trillion in 2024. Government's share of overall health spending was 64.3% of national health expenditures in 2013 and will rise to 67.1% in 2024. Government health expenditures in the United States account for a larger share of gross domestic product (11.2% in 2013) than do total health expenditures in any other nation. CONCLUSIONS: Contrary to public perceptions and official Centers for Medicare and Medicaid Services estimates, government funds most health care in the United States. Appreciation of government's predominant role in health funding might encourage more appropriate and equitable targeting of health expenditures.

Malhotra, C. et Do, Y. K. (2016). "Public health expenditure and health system responsiveness for low-income individuals: results from 63 countries." Health Policy Plan.

Improvement in overall responsiveness to people's expectations is an important goal for any health system; socioeconomic equity in responsiveness is equally important. However, it is not known if socioeconomic disparities in responsiveness can be reduced through greater public health expenditures. This article assesses the relationship of the proportion of public health expenditure over total health expenditure (PPHE) with responsiveness for poorest individuals and the difference in responsiveness between the richest and poorest individuals. We used data from six responsiveness dimensions (prompt attention, dignity, choice, clarity of information, confidentiality and quality of basic amenities) of outpatient services from World Health Survey data from 63 countries. Hierarchical Ordered Probit (HOPIT) models assessed the probability of 'very good' responsiveness in each domain among the poorest and richest individuals for each country, correcting for reporting heterogeneity through vignettes. Linear regression models were then used to assess the association between predicted probabilities from HOPIT models and PPHE, adjusting for (log) Gross Domestic Product per capita. The study findings showed that higher PPHE was associated with a higher probability of 'very good' responsiveness for each domain among the poorest individuals, and with smaller pro-rich disparities in responsiveness between the richest and poorest individuals. In conclusion, increasing PPHE may improve the responsiveness of health services for the poorest individuals and reduce disparities in responsiveness between the richest and poorest individuals.

Pegon-Machat, E., et al. (2016). "The healthcare system and the provision of oral healthcare in EU Member States: France." Br Dent J **220**(4): 197-203.

The French oral health system is based on the provision of dental treatment and is organised around a fee-per-item model. The system is funded by a complex mix of public and complementary health insurance schemes. The system is successful in that it provides access to affordable dental treatment to the majority of the French population. However, France had the highest health expenditure as a share of gross domestic product (GDP) of all European Union countries in 2008 and rising oral health inequalities may be exacerbated by the manner in which oral health care is provided and funded. In addition, there is no

organised national strategy for the prevention of oral diseases or for oral health promotion.

Pritchard, C., et al. (2016). "Comparing UK and 20 Western countries' efficiency in reducing adult (55-74) cancer and total mortality rates 1989-2010: Cause for cautious celebration? A population-based study." JRSM Open **7**(6): 2054270416635036.

OBJECTIVE: Every Western nation expends vast sums on health, especially for cancer; thus, the question is how efficient is the UK in reducing adult (55-74) cancer mortality rates and total mortality rates (TMR) compared to the other Western nations in the context of economic-input to health, the percentage of Gross-Domestic-Product-expenditure-on-Health. DESIGN: WHO mortality rates for baseline 3 years 1989-1991 and 2008-2010 were analysed, and confidence intervals determine any significant differences between the UK and other countries in reducing the mortalities. Efficiency ratios are calculated by dividing reduced mortality over the period by the average % of national income. SETTING: Twenty-one similar socio-economic Western countries. PARTICIPANTS: The 21 countries' general population. MAIN OUTCOME MEASURES: Cancer mortality rates, total mortality rates Gross Domestic Product and Efficiency Ratios. RESULTS: Economic Input: In 1980, UK national income was 5.6% and the European average was 7.1%. By 2010, UK national income was 9.4% being equal 17th of 21 averaging 7.1% over the period. Europe's 1980-2010 average of 8.4% yields a UK to Europe ratio of 1:1.18. Clinical output 1989-2010: UK Cancer Mortality Rates was the sixth highest, but equal sixth biggest fall, significantly greater than 14 other countries. UK Total Mortality Rates was the fifth highest but third biggest decline, significantly greater than 17 countries. UK's cancer Efficiency Ratios is largest at 1:301 and second biggest for Total Mortality Rates at 1.1341; the USA ratios were 1:152 and 1:525, respectively. CONCLUSIONS: UK reduced mortalities indicate that the NHS achieves proportionally more with relatively less, but UK needs to match European average Gross-Domestic-Product-expenditure-on-Health to meet future challenges.

Wang, F., et al. (2016). "Health expenditures spent for prevention, economic performance, and social welfare." Health Econ Rev **6**(1): 45.

BACKGROUND: Countries with limited resources in economic downturns often reduce government expenditures, of which spending on preventive healthcare with no apparent immediate health impact might be cut down first. This research aims to find the optimum share of preventive health expenditure to gross domestic product (GDP) and investigate the implications of preventive health services on economic performance and the population's wellbeing. METHODS: We develop the economic growth model to undertake health-economic analyses and parameterize for Taiwan setting. Based on the US experiences over the period from 1975 to 2013, this research further examines the model's predictions on the relationship between preventive health expenditure and economic performance. RESULTS: Theoretical analysis and numerical simulations show that an inverse U-shaped relationship exists between the proportion of GDP spent on prevention and social welfare, as well as between the proportion spent on prevention and economic growth. Empirical analysis shows an under-investment in prevention in Taiwan. The spending of preventive healthcare in Taiwan government was 0.0027 GDP in 2014, while the optimization levels for economic development and social welfare would be 0 . 0119 and 0 . 0203, respectively. There is a statistically significant nonlinear relationship between health expenditure on prevention and the estimated real impact of economic performance from US experiences. The welfare-maximizing proportion of preventive expenditure is usually greater than the proportion maximizing economic growth, indicating a conflict between economic growth and welfare after a marginal share. CONCLUSION: Our findings indicate that it is worthwhile increasing investment on prevention up until an optimization level for economic development and

social welfare. Such levels could also be estimated in other economies.

2015

Gilligan, A. M. et Skrepnek, G. H. (2015). "Determinants of life expectancy in the Eastern Mediterranean Region." Health Policy Plan **30**(5): 624-637.

BACKGROUND: Although the Eastern Mediterranean Region (EMR) healthcare sector has been expanding rapidly, many differences exist across socioeconomic status, clinical practice standards and healthcare systems. OBJECTIVE: Predict production functions of health by measuring socioeconomic and expenditure factors that impact life expectancy in the EMR. METHODS: Data from the World Health Organization (WHO) Global Health Observatory and the World Bank were used for this cross-sectional, time-series study spanning 21 nations in the EMR from 1995 to 2010. The primary outcome was life expectancy at birth. Covariates of interest included sociodemographic and health indicators. To both establish and validate appropriate categorization of countries, a cluster analysis was undertaken to group cases by taking selected characteristics into account. A variance-component, multilevel mixed-effects linear model was employed that incorporated a finite, Almon, distributed lag of 5 years and bootstrapping with 5000 simulations to model the production function of life expectancy. RESULTS: Results of the cluster analysis found four groupings. Clusters 1 and 2, composed of six total countries, generally represented non-industrialized/least developed countries. Clusters 3 and 4, totalling 15 nations, captured more industrialized nations. Overall, gross domestic product (GDP) (P = 0.011), vaccination averages (P = 0.026) and urbanization (P = 0.026), were significant positive predictors of life expectancy. No significant predictors existed for Cluster 1 countries. Among Cluster 2 nations, physician density (P = 0.014) and vaccination averages (P = 0.044) were significant positive predictors. GDP (P = 0.037) and literacy (P = 0.014) were positive significant predictors among Cluster 3 nations. GDP (P = 0.002), health expenditures (P = 0.002) and vaccination averages (P = 0.014) were positive significant predictors in Cluster 4 countries. CONCLUSION: Predictors of life expectancy differed between non-industrialized and industrialized nations, with the exception of vaccination averages. Non-industrialized/least developed nations were associated with adjusted life expectancies of >14% lower than their industrialized peers. Continued work to address differences in the quality of and access to care in the EMR is required.

Hermanowski, T., et al. (2015). "ANALYSIS OF TRENDS IN LIFE EXPECTANCIES AND PER CAPITA GROSS DOMESTIC PRODUCT AS WELL AS PHARMACEUTICAL AND NON-PHARMACEUTICAL HEALTHCARE EXPENDITURES." Acta Pol Pharm **72**(5): 1045-1050.

Life expectancy is a common measure of population health. Macro-perspective based on aggregated data makes it possible to approximate the impact of different levels of pharmaceutical expenditure on general population health status and is often used in cross-country comparisons. The aim of the study was to determine whether there are long-run relations between life expectancy, total healthcare expenditures, and pharmaceutical expenditures in OECD countries. Common trends in per capita gross domestic products (GDPs) (excluding healthcare expenditures), per capita healthcare expenditures (excluding pharmaceutical expenditures), per capita pharmaceutical expenditures, and life expectancies of women and men aged 60 and 65 were analyzed across OECD countries. Short-term effect of pharmaceutical expenditure onto life expectancy was also estimated by regressing the deviations of life expectancies from their long-term trends onto the deviations of pharmaceutical and non-pharmaceutical health expenditures, as well as GDP from their trends. The dataset was created on the basis of OECD Health Data for 34 countries and the

years 1991-2010. Life expectancy variables were used as proxies for the health outcomes, whereas the pharmaceutical and healthcare expenditures represented drug and healthcare consumption, respectively. In general, both expenditures and life expectancies tended to increase in all of the analyzed countries; however, the growth rates differed across the countries. The analysis of common trends indicated the existence of common long-term trends in life expectancies and per capita GDP as well as pharmaceutical and non-pharmaceutical healthcare expenditures. However, there was no evidence that pharmaceutical expenditures provided additional information about the long-term trends in life expectancies beyond that contained in the GDP series. The analysis based on the deviations of variables from their long-term trends allowed concluding that pharmaceutical expenditures significantly influenced life expectancies in the short run. Non-pharmaceutical healthcare expenditures were found to be significant in one out of four models (for life expectancy of women aged 65), while GDPs were found to be insignificant in all four models. The results of the study indicate that there are common long-term trends in life expectancies and per capita GDP as well as pharmaceutical and non-pharmaceutical healthcare expenditures. The available data did not reveal any cause- effect relationship. Other factors, for which the systematic data were not available, may have determined the increase in life expectancy in OECD countries. Significant positive short-term relations between pharmaceutical expenditures and life expectancies in OECD countries were found. The significant short-term effect of pharmaceutical expenditures onto life expectancy means that an increase of pharmaceutical expenditures above long-term trends would lead to a temporary increase in life expectancy above its corresponding long-term trend. However, this effect would not persist as pharmaceutical expenditures and life expectancy would converge to levels determined by the long-term trends.

Wang, F. (2015). "More Health Expenditure, Better Economic Performance? Empirical Evidence From OECD Countries." Inquiry **52**.

Recent economic downturns have led many countries to reduce health spending dramatically, with the World Health Organization raising concerns over the effects of this, in particular among the poor and vulnerable. With the provision of appropriate health care, the population of a country could have better health, thus strengthening the nation's human capital, which could contribute to economic growth through improved productivity. How much should countries spend on health care? This study aims to estimate the optimal health care expenditure in a growing economy. Applying the experiences of countries from the Organization for Economic Co-Operation and Development (OECD) over the period 1990 to 2009, this research introduces the method of system generalized method of moments (GMM) to derive the design of the estimators of the focal variables. Empirical evidence indicates that when the ratio of health spending to gross domestic product (GDP) is less than the optimal level of 7.55%, increases in health spending effectively lead to better economic performance. Above this, more spending does not equate to better care. The real level of health spending in OECD countries is 5.48% of GDP, with a 1.87% economic growth rate. The question which is posed by this study is a pertinent one, especially in the current context of financially constrained health systems around the world. The analytical results of this work will allow policymakers to better allocate scarce resources to achieve their macroeconomic goals.

2014

Batouli, A., et al. (2014). "The global cancer divide: relationships between national healthcare resources and cancer outcomes in high-income vs. middle- and low-income countries." J

Epidemiol Glob Health **4**(2): 115-124.

BACKGROUND: Cancer continues to rise as a contributor to premature death in the developing world. Despite this, little is known about whether cancer outcomes are related to a country's income level, and what aspects of national healthcare systems are associated with improved cancer outcomes. METHODS: The most recent estimates of cancer incidence and mortality were used to calculate mortality-to-incidence ratio (MIR) for the 85 countries with reliable data. Countries were categorized according to high-income (Gross Domestic Product (GDP)>$15,000) or middle/low-income (GDP<$15,000), and a multivariate linear regression model was used to determine the association between healthcare system indicators and cancer MIR. Indicators study included per capita GDP, overall total healthcare expenditure (THE), THE as a proportion of GDP, total external beam radiotherapy devices (TEBD) per capita, physician density, and the year 2000 WHO healthcare system rankings. RESULTS: Cancer MIR in high-income countries (0.47) was significantly lower than that of middle/low-income countries (0.64), with a p<0.001. In high-income countries, GDP, health expenditure and TEBD showed significant inverse correlations with overall cancer MIR. A $3040 increase in GDP (p=0.004), a $379 increase in THE (p<0.001), or an increase of 0.59 TEBD per 100,000 population (p=0.027) were all associated with a 0.01 decrease in cancer MIR. In middle/low-income countries, only WHO scores correlated with decreased cancer MIR (p=0.022); 12 specific cancer types also showed similar significant correlations (p<0.05) as overall cancer MIR. CONCLUSIONS: The analysis of this study suggested that cancer MIR is greater in middle/low-income countries. Furthermore, the WHO healthcare score was associated with improved cancer outcomes in middle/low-income countries while absolute levels of financial resources and infrastructure played a more important role in high-income countries.

Martin, A. B., et al. (2014). "National health spending in 2012: rate of health spending growth remained low for the fourth consecutive year." Health Aff (Millwood) **33**(1): 67-77.

For the fourth consecutive year, growth in health care spending remained low, increasing by 3.7 percent in 2012 to $2.8 trillion. At the same time, the share of the economy devoted to health fell slightly (from 17.3 percent to 17.2 percent) as the nominal gross domestic product (GDP) grew by 4.6 percent. Faster growth in hospital services and in physician and clinical services was mitigated by slower growth in prices for prescription drugs and nursing home services. Despite an uptick in enrollment growth, Medicare spending growth slowed slightly in 2012, mainly due to lower payment updates. For Medicaid, slowing enrollment growth kept spending growth near historic lows. Growth in private health insurance spending also remained near historically low rates in 2012, largely influenced by the nation's modest economic recovery and its impact on enrollment.

Reeves, A., et al. (2014). "The political economy of austerity and healthcare: cross-national analysis of expenditure changes in 27 European nations 1995-2011." Health Policy **115**(1): 1-8.

Why have patterns of healthcare spending varied during the Great Recession? Using cross-national, harmonised data for 27 EU countries from 1995 to 2011, we evaluated political, economic, and health system determinants of recent changes to healthcare expenditure. Data from EuroStat, the IMF, and World Bank (2013 editions) were evaluated using multivariate random- and fixed-effects models, correcting for pre-existing time-trends. Reductions in government health expenditure were not significantly associated with magnitude of economic recessions (annual change in GDP, p=0.31, or cumulative decline, p=0.40 or debt crises (measured by public debt as a percentage of GDP, p=0.38 or per capita, p=0.83)). Nor did ideology of governing parties have an effect. In contrast, each $100

reduction in tax revenue was associated with a $2.72 drop in health spending (95% CI: $1.03-4.41). IMF borrowers were significantly more likely to reduce healthcare budgets than non-IMF borrowers (OR=3.88, 95% CI: 1.95 -7.74), even after correcting for potential confounding by indication. Exposure to lending from international financial institutions, tax revenue falls, and decisions to implement cuts correlate more closely than underlying economic conditions or orientation of political parties with healthcare expenditure change in EU member states.

2013

Fuchs, V. R. (2013). "The gross domestic product and health care spending." N Engl J Med **369**(2): 107-109.

Gregorio, L. E. et Gregorio, D. I. (2013). "Polity and health care expenditures: the association among 159 nations." J Epidemiol Glob Health **3**(1): 49-57.

This paper hypothesized that democratic nations, as characterized by Polity IV Project regime scores, spend more on health care than autocratic nations and that the association reported here is independent of other demographic, health system or economic characteristics of nations. WHO Global Observatory data on 159 nations with roughly 98% of the world's population were examined. Regime scores had significant, direct and independent associations with each of four measures of health care expenditure. For every unit increment in a nation's regime score toward a more democratic authority structure of governance, we estimated significant ($p<0.05$) increments in the percent of GDP expended on health care (+0.14%), percent of general government expenditures targeted to health care (+0.25%), total per capita expenditures on health (+34.4Int$) and per capita general government expenditures (+22.4Int$), while controlling for a population's age distribution, life expectancy, health care workforce and system effectiveness and gross national income. Moreover, these relationships were found to persist across socio-economic development levels. The finding that practices of health care expenditure and authority structures of government co-vary is instructive about the politics of health and the challenges of advancing global health objectives.

Hadad, S., et al. (2013). "Determinants of healthcare system's efficiency in OECD countries." Eur J Health Econ **14**(2): 253-265.

OBJECTIVE: Firstly, to compare healthcare systems' efficiency (HSE) using two models: one incorporating mostly inputs that are considered to be within the discretionary control of the healthcare system (i.e., physicians' density, inpatient bed density, and health expenditure), and another, including mostly inputs beyond healthcare systems' control (i.e., GDP, fruit and vegetables consumption, and health expenditure). Secondly, analyze whether institutional arrangements, population behavior, and socioeconomic or environmental determinants are associated with HSE. DESIGN: Data envelopment analysis (DEA) was utilized to calculate OECD countries' HSE. Life expectancy and infant survival rate were considered as outputs in both models. Healthcare systems' rankings according to the super-efficiency and the cross-efficiency ranking methods were used to analyze determinants associated with efficiency. RESULTS: (1) Healthcare systems in nine countries with large and stable economies were defined as efficient in model I, but were found to be inefficient in model II; (2) Gatekeeping and the presence of multiple insurers were associated with a lower efficiency; and (3) The association between socioeconomic and environmental indicators was found to be ambiguous. CONCLUSIONS: Countries striving to improve their HSE should aim to impact population behavior and welfare rather than only ensure adequate medical care. In addition,

they may consider avoiding specific institutional arrangements, namely gatekeeping and the presence of multiple insurers. Finally, the ambiguous association found between socioeconomic and environmental indicators, and a country's HSE necessitates caution when interpreting different ranking techniques in a cross-country efficiency evaluation and needs further exploration.

Hanf, M., et al. (2013). "Global determinants of mortality in under 5s: 10 year worldwide longitudinal study." Bmj **347**: f6427.

OBJECTIVE: To assess at country level the association of mortality in under 5s with a large set of determinants. DESIGN: Longitudinal study. SETTING: 193 United Nations member countries, 2000-09. METHODS: Yearly data between 2000 and 2009 based on 12 world development indicators were used in a multivariable general additive mixed model allowing for non-linear relations and lag effects. MAIN OUTCOME MEASURE: National rate of deaths in under 5s per 1000 live births RESULTS: The model retained the variables: gross domestic product per capita; percentage of the population having access to improved water sources, having access to improved sanitation facilities, and living in urban areas; adolescent fertility rate; public health expenditure per capita; prevalence of HIV; perceived level of corruption and of violence; and mean number of years in school for women of reproductive age. Most of these variables exhibited non-linear behaviours and lag effects. CONCLUSIONS: By providing a unified framework for mortality in under 5s, encompassing both high and low income countries this study showed non-linear behaviours and lag effects of known or suspected determinants of mortality in this age group. Although some of the determinants presented a linear action on log mortality indicating that whatever the context, acting on them would be a pertinent strategy to effectively reduce mortality, others had a threshold based relation potentially mediated by lag effects. These findings could help designing efficient strategies to achieve maximum progress towards millennium development goal 4, which aims to reduce mortality in under 5s by two thirds between 1990 and 2015.

Hartman, M., et al. (2013). "National health spending in 2011: overall growth remains low, but some payers and services show signs of acceleration." Health Aff (Millwood) **32**(1): 87-99.

In 2011 US health care spending grew 3.9 percent to reach $2.7 trillion, marking the third consecutive year of relatively slow growth. Growth in national health spending closely tracked growth in nominal gross domestic product (GDP) in 2010 and 2011, and health spending as a share of GDP remained stable from 2009 through 2011, at 17.9 percent. Even as growth in spending at the national level has remained stable, personal health care spending growth accelerated in 2011 (from 3.7 percent to 4.1 percent), in part because of faster growth in spending for prescription drugs and physician and clinical services. There were also divergent trends in spending growth in 2011 depending on the payment source: Medicaid spending growth slowed, while growth in Medicare, private health insurance, and out-of-pocket spending accelerated. Overall, there was relatively slow growth in incomes, jobs, and GDP in 2011, which raises questions about whether US health care spending will rebound over the next few years as it typically has after past economic downturns.

Hernandez-Pena, P., et al. (2013). "Health worker remuneration in WHO Member States." Bull World Health Organ **91**(11): 808-815.

OBJECTIVE: To present the available data on the money spent by Member States of the World Health Organization (WHO) on remunerating health workers in the public and private sectors. METHODS: Data on government and total expenditure on health worker remuneration were obtained through a review of official documents in WHO's Global Health

Expenditure Database and directly from country officials and country official web sites. Such data are presented in this paper, by World Bank country income groups, in millions of national currency units per calendar year for salaried and non-salaried health workers. They are presented as a share of gross domestic product (GDP), total health expenditure and general government health expenditure. The average yearly change in remuneration (i.e. compound annual growth rate) between 2000 and 2012 as a function of these parameters was also assessed. FINDINGS: On average, payments to health workers of all types accounted for more than one third of total health expenditure across countries. Such payments have grown faster than countries' GDPs but less rapidly than total health expenditure and general government health expenditure. Remuneration of health workers, on the other hand, has grown faster than that of other types of workers. CONCLUSION: As they seek to attain universal health coverage (UHC), countries will need to devote an increasing proportion of their GDPs to health and health worker remuneration. However, the fraction of total health expenditure devoted to paying health workers seems to be declining, partly because the pursuit of UHC calls for strengthening the health system as a whole.

Keegan, C., et al. (2013). "Measuring recession severity and its impact on healthcare expenditure." Int J Health Care Finance Econ **13**(2): 139-155.

The financial crisis that manifested itself in late 2007 resulted in a Europe-wide economic crisis by 2009. As the economic climate worsened, Governments and households were put under increased strain and more focus was placed on prioritising expenditures. Across European countries and their heterogeneous health care systems, this paper examines the initial responsiveness of health expenditures to the crisis and whether recession severity can be considered a predictor of health expenditure growth. In measuring severity we move away from solely gross domestic product (GDP) as a metric and construct a recession severity index predicated on a number of key macroeconomic indicators. We then regress this index on measures of total, public and private health expenditure to identify potential relationships. Analysis suggests that for 2009, the Baltic States, along with Ireland, Italy and Greece, experienced comparatively severe recessions. We find, overall, an initial counter-cyclical response in health spending (both public and private) across countries. However, our analysis finds evidence of a negative relationship between recession severity and changes in certain health expenditures. As a predictor of health expenditure growth in 2009, the derived index is an improvement over GDP change alone.

King, N. B., et al. (2013). "Who cares about health inequalities? Cross-country evidence from the World Health Survey." Health Policy Plan **28**(5): 558-571.

Reduction of health inequalities within and between countries is a global health priority, but little is known about the determinants of popular support for this goal. We used data from the World Health Survey to assess individual preferences for prioritizing reductions in health and health care inequalities. We used descriptive tables and regression analysis to study the determinants of preferences for reducing health inequalities as the primary health system goal. Determinants included individual socio-demographic characteristics (age, sex, urban residence, education, marital status, household income, self-rated health, health care use, satisfaction with health care system) and country-level characteristics [gross domestic product (GDP) per capita, disability-free life expectancy, equality in child mortality, income inequality, health and public health expenditures]. We used logistic regression to assess the likelihood that individuals ranked minimizing inequalities first, and rank-ordered logistic regression to compare the ranking of other priorities against minimizing health inequalities. Individuals tended to prioritize health system goals related to overall improvement (improving population health and health care responsiveness) over those related to equality

and fairness (minimizing inequalities in health and responsiveness, and promoting fairness of financial contribution). Individuals in countries with higher GDP per capita, life expectancy, and equality in child mortality were more likely to prioritize minimizing health inequalities.

Moses, H., 3rd, et al. (2013). "The anatomy of health care in the United States." Jama **310**(18): 1947-1963.

Health care in the United States includes a vast array of complex interrelationships among those who receive, provide, and finance care. In this article, publicly available data were used to identify trends in health care, principally from 1980 to 2011, in the source and use of funds ("economic anatomy"), the people receiving and organizations providing care, and the resulting value created and health outcomes. In 2011, US health care employed 15.7% of the workforce, with expenditures of $2.7 trillion, doubling since 1980 as a percentage of US gross domestic product (GDP) to 17.9%. Yearly growth has decreased since 1970, especially since 2002, but, at 3% per year, exceeds any other industry and GDP overall. Government funding increased from 31.1% in 1980 to 42.3% in 2011. Despite the increases in resources devoted to health care, multiple health metrics, including life expectancy at birth and survival with many diseases, shows the United States trailing peer nations. The findings from this analysis contradict several common assumptions. Since 2000, (1) price (especially of hospital charges [+4.2%/y], professional services [3.6%/y], drugs and devices [+4.0%/y], and administrative costs [+5.6%/y]), not demand for services or aging of the population, produced 91% of cost increases; (2) personal out-of-pocket spending on insurance premiums and co-payments have declined from 23% to 11%; and (3) chronic illnesses account for 84% of costs overall among the entire population, not only of the elderly. Three factors have produced the most change: (1) consolidation, with fewer general hospitals and more single-specialty hospitals and physician groups, producing financial concentration in health systems, insurers, pharmacies, and benefit managers; (2) information technology, in which investment has occurred but value is elusive; and (3) the patient as consumer, whereby influence is sought outside traditional channels, using social media, informal networks, new public sources of information, and self-management software. These forces create tension among patient aims for choice, personal care, and attention; physician aims for professionalism and autonomy; and public and private payer aims for aggregate economic value across large populations. Measurements of cost and outcome (applied to groups) are supplanting individuals' preferences. Clinicians increasingly are expected to substitute social and economic goals for the needs of a single patient. These contradictory forces are difficult to reconcile, creating risk of growing instability and political tensions. A national conversation, guided by the best data and information, aimed at explicit understanding of choices, tradeoffs, and expectations, using broader definitions of health and value, is needed.

National Cancer Policy, F., et al. (2013). Delivering Affordable Cancer Care in the 21st Century: Workshop Summary. Washington (DC), National Academies Press (US)

Rising health care costs are a central fiscal challenge confronting the United States. National spending on health care currently accounts for 18 percent of gross domestic product (GDP), but is anticipated to increase to 25 percent of GDP by 2037. The Bipartisan Policy Center argues that "this rapid growth in health expenditures creates an unsustainable burden on America's economy, with far-reaching consequences". These consequences include crowding out many national priorities, including investments in education, infrastructure, and research; stagnation of employee wages; and decreased international competitiveness.In spite of health care costs that far exceed those of other countries, health outcomes in the United States are not considerably better. With the goal of ensuring that patients have

access to high-quality, affordable cancer care, the Institute of Medicine's (IOM's) National Cancer Policy Forum convened a public workshop, Delivering Affordable Cancer Care in the 21st Century, October 8-9, 2012, in Washington, DC. Delivering Affordable Cancer Care in the 21st Century summarizes the workshop.

Theou, O., et al. (2013). "Exploring the relationship between national economic indicators and relative fitness and frailty in middle-aged and older Europeans." Age Ageing **42**(5): 614-619.

BACKGROUND: on an individual level, lower-income has been associated with disability, morbidity and death. On a population level, the relationship of economic indicators with health is unclear. OBJECTIVE: the purpose of this study was to evaluate relative fitness and frailty in relation to national income and healthcare spending, and their relationship with mortality. DESIGN AND SETTING: secondary analysis of data from the Survey of Health, Ageing and Retirement in Europe (SHARE); a longitudinal population-based survey which began in 2004. SUBJECTS: a total of 36,306 community-dwelling people aged 50 and older (16,467 men; 19,839 women) from the 15 countries which participated in the SHARE comprised the study sample. A frailty index was constructed as the proportion of deficits present in relation to the 70 deficits available in SHARE. The characteristics of the frailty index examined were mean, prevalence of frailty and proportion of the fittest group. RESULTS: the mean value of the frailty index was lower in higher-income countries (0.16 +/- 0.12) than in lower-income countries (0.20 +/- 0.14); the overall mean frailty index was negatively correlated with both gross domestic product ($r = -0.79$; $P < 0.01$) and health expenditure ($r = -0.63$; $P < 0.05$). Survival in non-frail participants at 24 months was not associated with national income ($P = 0.19$), whereas survival in frail people was greater in higher-income countries ($P < 0.05$). CONCLUSIONS: a country's level of frailty and fitness in adults aged 50+ years is strongly correlated with national economic indicators. In higher-income countries, not only is the prevalence of frailty lower, but frail people also live longer.

2012

Cylus, J., et al. (2012). "Is there a statistical relationship between economic crises and changes in government health expenditure growth? an analysis of twenty-four European countries." Health Serv Res **47**(6): 2204-2224.

OBJECTIVE: To identify whether, by what means, and the extent to which historically, government health care expenditure growth in Europe has changed following economic crises. DATA SOURCES: Organization for Economic Cooperation and Development Health Data 2011. STUDY DESIGN: Cross-country fixed effects multiple regression analysis is used to determine whether statutory health care expenditure growth in the year after economic crises differs from that which would otherwise be predicted by general economic trends. Better understanding of the mechanisms involved is achieved by distinguishing between policy responses which lead to cost-shifting and all others. FINDINGS: In the year after an economic downturn, public health care expenditure grows more slowly than would have been expected given the longer term economic climate. Cost-shifting and other policy responses are both associated with these slowdowns. However, while changes in tax-derived expenditure are associated with both cost-shifting and other policy responses following a crisis, changes in expenditure derived from social insurance have been associated only with changes in cost-shifting. CONCLUSIONS: Disproportionate cuts to the health sector, as well as reliance on cost-shifting to slow growth in health care expenditure, serve as a warning in terms of potentially negative effects on equity, efficiency, and quality of health services and, potentially, health outcomes following economic crises.

Ikegami, N. et Anderson, G. F. (2012). "In Japan, all-payer rate setting under tight government control has proved to be an effective approach to containing costs." Health Aff (Millwood) **31**(5): 1049-1056.

In Japan's health insurance system, the prices paid by multiple payers for nearly all health care goods and services are codified into a single fee schedule and are individually revised within the global rate set by the government. This single payment system has allowed total health care spending to be controlled despite a fee-for-service system with its incentives for increased volume of services; Japan's growing elderly population; and the regular introduction of new technologies and therapies. This article describes aspects of Japan's approach, as well as how that nation has expanded payment for inpatient hospital care based on case-mix. The result of the payment system is that Japan's rate of health spending growth has been well below that of other industrial nations. The percentage of gross domestic product spent on health increased from 7.7 percent in 2000 to 8.5 percent in 2008, compared to an increase from 13.7 percent to 16.4 percent in the United States. Japan's approach confirms that enlightened government regulation can maintain access to care, avoid rationing, make use of the latest technology, and allow for multiple insurance plans and an aging population--all while restraining the growth of health care spending.

Martin, A. B., et al. (2012). "Growth in US health spending remained slow in 2010; health share of gross domestic product was unchanged from 2009." Health Aff (Millwood) **31**(1): 208-219.

Medical goods and services are generally viewed as necessities. Even so, the latest recession had a dramatic effect on their utilization. US health spending grew more slowly in 2009 and 2010-at rates of 3.8 percent and 3.9 percent, respectively-than in any other years during the fifty-one-year history of the National Health Expenditure Accounts. In 2010 extraordinarily slow growth in the use and intensity of services led to slower growth in spending for personal health care. The rates of growth in overall US gross domestic product (GDP) and in health spending began to converge in 2010. As a result, the health spending share of GDP stabilized at 17.9 percent.

Sposato, L. A. et Saposnik, G. (2012). "Gross domestic product and health expenditure associated with incidence, 30-day fatality, and age at stroke onset: a systematic review." Stroke **43**(1): 170-177.

BACKGROUND AND PURPOSE: Differences in definitions of socioeconomic status and between study designs hinder their comparability across countries. We aimed to analyze the correlation between 3 widely used macrosocioeconomic status indicators and clinical outcomes. METHODS: We selected population-based studies reporting incident stroke risk and/or 30-day case-fatality according to prespecified criteria. We used 3 macrosocioeconomic status indicators that are consistently defined by international agencies: per capita gross domestic product adjusted for purchasing power parity, total health expenditures per capita at purchasing power parity, and unemployment rate. We examined the correlation of each macrosocioeconomic status indicator with incident risk of stroke, 30-day case-fatality, proportion of hemorrhagic strokes, and age at stroke onset. RESULTS: Twenty-three articles comprising 30 population-based studies fulfilled the eligibility criteria. Age-adjusted incident risk of stroke using the standardized World Health Organization World population was associated to lower per capita gross domestic product adjusted for purchasing power parity (rho=-0.661, P=0.027, R(2)=0.32) and total health expenditures per capita at purchasing power parity (rho=-0.623, P=0.040, R(2)=0.26). Thirty-

day case-fatality rates and proportion of hemorrhagic strokes were also related to lower per capita gross domestic product adjusted for purchasing power parity and total health expenditures per capita at purchasing power parity. Moreover, stroke occurred at a younger age in populations with low per capita gross domestic product adjusted for purchasing power parity and total health expenditures per capita at purchasing power parity. There was no correlation between unemployment rates and outcome measures. CONCLUSIONS: Lower per capita gross domestic product adjusted for purchasing power parity and total health expenditures per capita at purchasing power parity were associated with higher incident risk of stroke, higher case-fatality, a greater proportion of hemorrhagic strokes, and lower age at stroke onset. As a result, these macrosocioeconomic status indicators may be used as proxy measures of quality of primary prevention and acute care and considered as important factors for developing strategies aimed at improving worldwide stroke care.

Vannelli, A., et al. (2012). "Economic growth and health progress in Italy: 30 years of National Health Service." Ig Sanita Pubbl **68**(5): 733-748.

On December 23 of 1978, during first Italian recession since the end of World War II, Parliament voted for Law 833 that gives birth to the Italian National Public Health Services (SSN) as the new and alternative model of health care system. It was the beginning of the match of Italian health care with the world class level of the public health care. Each crisis requires solidarity and actions. Maintaining levels of health and other social expenditures is critical to protect life and livelihood and to boost productivity. The purpose of the present study is to establish an alternative point of view to demonstrate that Gross Domestic Product, is a function of health care expenditure. The chronology of the events was created by using the laws published on "Gazzetta Ufficiale" (GU). In order to analyze the corporate effectiveness and efficiency, we have divided the SSN into its three main components, namely resources (input), services (output) and performances (outcome). Health services have certainly been pioneers and are still today standard-bearers of a challenge which has borne its fruits. According to the "Organization for Economic Co-operation and Development", SSN ranks second in the world classification of the return on the health care services in 2000. The World Health Organization has published in 2005 the same result: SSN ranks second in the world for ability and quality of the health care in relationship to the resources invested The continuous reforms of health care system introduced stability to the Italian system more than others countries. Success of SSN function rooted in the ability of system to adapt assuring mechanism of positive feed-back correction. In the future SSN, will required new set of reforms, such as redefinition of structures and mechanisms of governance, strategic plans, clinical administrations.

Woodward, R. S. et Wang, L. (2012). "The oh-so straight and narrow path: can the health care expenditure curve be bent?" Health Econ **21**(8): 1023-1029.

Although there is much talk about whether or not the current health care reform will 'bend' the health care expenditure 'curve', exactly which 'curve' is to be 'bent' is often ill-specified. This essay notes that the 'curve' defined by the log of US national health care expenditures per capita plotted against the log of the US gross domestic product per capita has been remarkably straight since 1929 despite Medicare and Medicaid and all of the more recent reform attempts. After establishing stationarity and considering cointegration and endogeneity, the slope of this log-log relationship suggests a per capita expenditure-income elasticity of 1.388. The authors suggest two explanatory hypotheses consistent with the observed constant slope. First, many new technologies are endogenous because their introduction is determined by their expected market, which is in turn dependent on GDP per capita. Second, the authors emphasize the potential utility gained by spending

disproportionately larger proportions of our growing income on hope, uncertainty-reducing information, and consumer amenities, all of which may be independent of any improved health outcome.

2011

Bradley, E. H., et al. (2011). "Health and social services expenditures: associations with health outcomes." BMJ Qual Saf **20**(10): 826-831.

OBJECTIVE: To examine variations in health service expenditures and social services expenditures across Organisation for Economic Co-operation and Development (OECD) countries and assess their association with five population-level health outcomes. DESIGN: A pooled, cross-sectional analysis using data from the 2009 release of the OECD Health Data 2009 Statistics and Indicators and OECD Social Expenditure Database. SETTING: OECD countries (n = 30) from 1995 to 2005. MAIN OUTCOMES: Life expectancy at birth, infant mortality, low birth weight, maternal mortality and potential years of life lost. RESULTS: Health services expenditures adjusted for gross domestic product (GDP) per capita were significantly associated with better health outcomes in only two of five health indicators; social services expenditures adjusted for GDP were significantly associated with better health outcomes in three of five indicators. The ratio of social expenditures to health expenditures was significantly associated with better outcomes in infant mortality, life expectancy and increased potential life years lost, after adjusting for the level of health expenditures and GDP. CONCLUSION: Attention to broader domains of social policy may be helpful in accomplishing improvements in health envisioned by advocates of healthcare reform.

Malley, J., et al. (2011). "The effect of lengthening life expectancy on future pension and long-term care expenditure in England, 2007 to 2032." Health Stat Q(52): 33-61.

BACKGROUND: The aim of this analysis is to examine the effect of different assumptions about future trends in life expectancy (LE) on the sustainability of the pensions and long-term care (LTC) systems. The context is the continuing debate in England about the reform of state pensions and the reform of the system for financing care and support. METHODS: Macro and micro simulation models are used to make projections of future public expenditure on LTC services for older people and on state pensions and related benefits, making alternative assumptions on increases in future LE. The projections cover the period 2007 to 2032 and relate to England. RESULTS: Results are presented for a base case and for specified variants to the base case. The base case assumes that the number of older people by age and gender rises in line with the Office for National Statistics' principal 2006-based population projection for England. It also assumes no change in disability rates, no changes in patterns of care, no changes in policy and rises in unit care costs and real average earnings by 2 per cent per year. Under these assumptions public expenditure on pensions and related benefits is projected to rise from 4.7 per cent of Gross Domestic Product (GDP) in 2007 to 6.2 per cent of GDP in 2032 and public expenditure on LTC from 0.9 per cent of GDP in 2007 to 1.6 per cent of GDP in 2032. Under a very high LE variant to the GAD principal projection, however, public expenditure on pensions and related benefits is projected to reach 6.8 per cent of GDP in 2032 and public expenditure on LTC 1.7 per cent of GDP in 2032. CONCLUSIONS: Policymakers developing reform proposals need to recognise that, since future LE is inevitably uncertain and since variant assumptions about future LE significantly affect expenditure projections, there is a degree of uncertainty about the likely impact of demographic pressures on future public expenditure on pensions and LTC.

Martin, A., et al. (2011). "Recession contributes to slowest annual rate of increase in health spending in five decades." Health Aff (Millwood) **30**(1): 11-22.

In 2009, US health care spending grew 4.0 percent--a historically low rate of annual increase--to $2.5 trillion, or $8,086 per person. Despite the slower growth, the share of the gross domestic product devoted to health spending increased to 17.6 percent in 2009 from 16.6 percent in 2008. The growth rate of health spending continued to outpace the growth of the overall economy, which experienced its largest drop since 1938. The recession contributed to slower growth in private health insurance spending and out-of-pocket spending by consumers, as well as a reduction in capital investments by health care providers. The recession also placed increased burdens on households, businesses, and governments, which meant that fewer financial resources were available to pay for health care. Declining federal revenues and strong growth in federal health spending increased the health spending share of total federal revenue from 37.6 percent in 2008 to 54.2 percent in 2009.

Pritchard, C. et Hickish, T. (2011). "Comparing cancer mortality and GDP health expenditure in England and Wales with other major developed countries from 1979 to 2006." Br J Cancer **105**(11): 1788-1794.

BACKGROUND: Cancer and gross-domestic-product on health expenditure (GDPHE) are critical issues for major developed countries (MDC). Each country's economic input, GDPHE 1980-2005 is contrasted with clinical outputs, cancer mortality rates (CMRs), to compare their efficiency and effectiveness in reducing CMR. METHODS: World Health Organization's CMR data for baseline years (1979-1981) are compared with 2004-2006 by sex and age. The chi(2)-tests are used to determine differences between MDC. Efficiency is analysed by calculating a ratio of average GDPHE to reduced CMR over the period. RESULTS: Inputs: All the countries GDPHE grew substantially. For the United Kingdom this reached 9.3%, which is below the MDC average (10%). Outputs: CMR fell substantially (>20%) in six of the ten countries. The male average (15-74 years) CMR in England and Wales had been third highest but by 2004-2006 was sixth, a 31% reduction, which was significantly greater than seven other countries. Initially England and Wales female average CMR was the highest of all countries and is now the second highest. There were significantly greater reductions for the 55-64 and 65-74 years old than in seven and four countries, respectively. GDPHE reduced CMR ratios--the average GDPHE:reduced CMR ratio of England and Wales was 1:120, greater than all MDC and double that in four countries. CONCLUSION: Comparing GDPHE input with CMR output showed that relatively the NHS achieved more with proportionately less than other MDC.

Sulku, S. N. et Caner, A. (2011). "Health care expenditures and gross domestic product: the Turkish case." Eur J Health Econ **12**(1): 29-38.

Our study examines the long-term relationship among per capita gross domestic product (GDP), per capita health expenditures and population growth rate in Turkey during the period 1984-2006, employing the Johansen multivariate co-integration technique. Related previous studies on OECD countries have mostly excluded Turkey-itself an OECD country. The only study on Turkey examines the period 1984-1998. However, after 1998, major events and policy changes that had a substantial impact on income and health expenditures took place in Turkey, including a series of reforms to restructure the health and social security system. In contrast to earlier findings in the literature, we find that the income elasticity of total health expenditures is less than one, which indicates that health care is a necessity in Turkey during the period of analysis. According to our results, a 10% increase in per capita GDP is associated with an 8.7% increase in total per capita health expenditures, controlling

for population growth. We find that the income elasticity of public health expenditures is less than one. But, in the case of private health care expenditures, the elasticity is greater than one, meaning that private health care is a luxury good in Turkey.

2010

Di Matteo, L. (2010). "The sustainability of public health expenditures: evidence from the Canadian federation." Eur J Health Econ **11**(6): 569-584.

The fiscal sustainability of government health expenditures is defined as the gap between growth rates of spending and measures of the resource base. The results show that over the period 1965-2008, real per capita Canadian provincial government health spending has grown at rates that exceed growth in basic measures of the resource base such as per capita gross domestic product (GDP), per capita federal transfers and per capita provincial government revenues. Forecasts of future spending to 2035 using determinant regression and growth rate extrapolation techniques show that Canadian provincial government health spending is projected to continue rising in the future and its share of provincial GDP will rise. While the amount spent on health is ultimately a public policy choice, provincial government health spending also cannot continue growing faster than the resource base indefinitely.

Hartman, M., et al. (2010). "Health spending growth at a historic low in 2008." Health Aff (Millwood) **29**(1): 147-155.

In 2008, U.S. health care spending growth slowed to 4.4 percent--the slowest rate of growth over the past forty-eight years. The deceleration was broadly based for nearly all payers and health care goods and services, as growth in both price and nonprice factors slowed amid the recession. Despite the slowdown, national health spending reached $2.3 trillion, or $7,681 per person, and the health care portion of gross domestic product (GDP) grew from 15.9 percent in 2007 to 16.2 percent in 2008. These developments reflect the general pattern that larger increases in the health spending share of GDP generally occur during or just after periods of economic recession. Despite the overall slowdown in national health spending growth, increases in this spending continue to outpace growth in the resources available to pay for it.

Munoz, E., et al. (2010). "National and surgical health care expenditures, 2005-2025." Ann Surg **251**(2): 195-200.

OBJECTIVE AND BACKGROUND: Health care expenditures for 2005 in the United States were $1.9733 trillion and 15.9% of the gross domestic product (GDP). Twenty-nine percent of those expenditures were secondary to surgical revenues. Health care expenditures are increasing 2(1/2) times the rate of the general US economy and are being fed by new technologies, new medications, the aging population, more services provided per patient, defensive medicine and little tort reform, the insurance system, and the free rider problem, ie, patients are cared for as emergencies regardless of insurance coverage and legality, which all have contributed to rising health care and surgical expenditures over the last 50 years. METHODS: The purpose of this study was to project aggregate national health care expenditures, aggregate surgical health care expenditures, and the United States GDP for the years 2005-2025. Model building and existing state and national data were used. Aggregate surgical health care expenditures were computed as 29% of aggregate health care expenditures using a unique model developed by the late Dr. Francis D. Moore. The model of Dr. Moore which used 1981 federal data was verified/tested using data from UMDNJ-

University Hospital, and New Jersey and national data from 2005. From 1965 to 2005 mean health care expenditures increased at 4.9% per year, and US GDP increased at a mean of 2.1% per year. RESULTS: Aggregate surgical expenditures are expected to grow from $572 billion in 2005 (4.6% of US GDP) to $912 billion (2005 dollars) in the year 2025 (7.3% of US GDP). Aggregate health care expenditures are projected to increase from $5572 per capita (15.9% of GDP) in 2005 to $8832 per capita (2005 dollars) in 2025 (25.2% of US GDP). Both surgery and national health care expenditures are expected to expand by almost 60% during the period 2005-2025. Thus, surgical health care expenditures by 2025 are likely to be 1/14 of the US economy, and health care expenditures will be (1/4) of the US economy. CONCLUSIONS: Real per capita GDP growth is relatively flat in the United States. Rising surgical health care expenditures and national health care expenditures are a significant issue for the US population. Unfortunately, programs at the state and federal level as well as private programs, for the last 50 years have not been able to slow the growth in health care expenditures. These trends are likely to continue and the effects will be: * A change in the US standard of living as surgical and health care expenditures become a larger part of the earned dollar per American especially with the current volatility of the US economy, * A rise in the cost of products made in the United States to pay the rising health care bill with a concomitant change in our national and international standard of living, and * An increasing debt and increases in federal and state taxes which will be required to maintain the current health care system, ie, Medicare, Medicaid, and the private health care insurance payment scheme, which has not changed substantially over the past 40 to 50 years. Surgeons must look at the incremental benefit of new technologies and procedures and determine which to choose if we are to slow the growth of surgical health care expenditures.

2009

Smith, S., et al. (2009). "Income, insurance, and technology: why does health spending outpace economic growth?" Health Aff (Millwood) **28**(5): 1276-1284.

A broad consensus holds that increased medical capability-technology-is the primary driver of health spending growth. However, technology does not expand independently of historical context; it is fueled by rising incomes and more generous insurance coverage. We estimate that medical technology explains 27-48 percent of health spending growth since 1960-a smaller percentage than earlier estimates. Income (gross domestic product, or GDP) growth plays a critical role, primarily through the actions of governments and employers on behalf of pools of consumers. The contribution of insurance is likely to differ, with less of a push from increasing generosity of coverage and more of a push from changes in provider payment.

2008

Acocella, G. (2008). "[How much of the GDP should be allocated to health care?]." G Ital Nefrol **25**(6): 632-635.

Health protection in Italy was allotted 8.9% of the gross domestic product in 2005. This is below the mean of the Organization for Cooperation and Economic Development (OCSE), which averaged 9.5%, as well as below that of France (11.1%), Germany (10.7%) and the United States (15.3%). Public health expenditure was 76% and private health expenditure 24%, whereas for OCSE these percentages averaged 80% and 20%, respectively. When the data are subdivided by area (Northern, Central and Southern Italy), the expenditure was 56.24% in Northern Italy, 56.39% in Central Italy, and 52.05% in Southern Italy. The National

Council for Economy and Work (CNEL) has determined that the health expenditure in Italy must be increased to OCSE levels. In addition, structural changes are needed to simplify the administrative process.

Anderson, G. F. et Frogner, B. K. (2008). "Health spending in OECD countries: obtaining value per dollar." Health Aff (Millwood) **27**(6): 1718-1727.

In 2005 the United States spent $6,401 per capita on health care-more than double the per capita spending in the median Organization for Economic Cooperation and Development (OECD) country. Between 1970 and 2005, the United States had the largest increase (8.3 percent) in the percentage of gross domestic product (GDP) devoted to health care among all OECD countries. Despite having the third-highest level of spending from public sources, public insurance covered only 26.2 percent of the U.S. population in 2005. The United States was equally likely to be in the top and bottom halves for sixteen quality measures compiled by the OECD.

Keehan, S., et al. (2008). "Health spending projections through 2017: the baby-boom generation is coming to Medicare." Health Aff (Millwood) **27**(2): w145-155.

The outlook for national health spending calls for continued steady growth. Spending growth is projected to be 6.7 percent in 2007, similar to its rate in 2006. Average annual growth over the projection period is expected to be 6.7 percent. Slower growth in private spending toward the end of the period is expected to be offset by stronger growth in public spending. The health share of gross domestic product (GDP) is expected to increase to 16.3 percent in 2007 and then rise throughout the projection period, reaching 19.5 percent of GDP by 2017.