

APPLIED DEMOGRAPHY IN THE PUBLIC SECTOR

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Abstract

The field of demography can be divided into two general areas, basic or academic demography and applied demography. In this paper, I differentiate the latter from the former and go on to discuss characteristics of applied demography in general as well as those found in the practice of applied demography in the public sector. Because demography generally uses population data gathered under the De Jure concept, the paper also discusses the importance of De Facto population information to both the private and public sectors. Professional recognition of applied demography and training are discussed. In addition to references for citations in the text, a set of suggested readings is provided.

Keywords

De Facto, De Jure, FSCPE, FSCPP, GIS, Household, PAA, Population estimates, Population projections, Private Sector, Public Sector, SDA, VALS, Washington State Census Board.

1. Introduction

Population estimates and projections are the heart and soul of applied demography and people have been making them for a long time.¹ In 1741, for example, Johann Süssmilch made the first of several estimates of world population (Swanson and Stephan, 2004) and in 1755, Benjamin Franklin was publishing projections of the population of the world (Swanson and Stephan, 2004). It was not until the middle part of the 20th century, however, that these efforts became institutionalized within the private and public sectors.

Since applied demography is part of the larger field of demography, it is useful to start by defining what demography is so that we can put the discussion of applied demography into the correct conceptual context. Demography can be defined as the study of population, typically focused on five aspects: (1) size, (2) geographic distribution, (3) composition, (4) the components of change (births, deaths, migration), and (5) the determinants and consequences of population change (Swanson and Stephan, 2004: 758).

As the preceding definition suggests, demographers share conceptual frameworks, methods, and data in common. For example, a demographer who specializes in studying the geographic distribution of populations typically deals with population size, composition, the components of population change and the determinants and consequences of population change. As such, this demographer would be using conceptual frameworks, methods, and data that would be familiar to other demographers, regardless of their specialties.

In spite of the shared commonalities, the work done by demographers can be distinguished in several ways. A distinction of interest here is that between basic (academic) demography and applied demography. Basic demography is primarily concerned with solving endogenously-defined problems by offering convincing explanations of demographic phenomena while viewing time and resources as barriers to surmount in order to maximize precision and explanatory power (Swanson, Burch and Tedrow, 1996).

Applied demography is primarily concerned with solving exogenously-defined problems by producing the information necessary to effect practical decision-making while minimizing the time and resources needed to produce this information (Swanson, Burch, and Tedrow, 1996). Because basic demographers are largely working on problems defined by demographers, they tend to look at both the determinants and consequences of population change. However, applied demographers tend to focus on the consequences of population change because they usually are involved in answering questions posed by non-demographers.

Both basic and applied demography can, themselves, also be subdivided into two subsets. Basic demography can be viewed as being composed of: (1) formal demography; and (2) population studies. Formal demography can be viewed as mathematics applied to human populations while population studies can be viewed as the application of sociological concepts and methods to human populations. There is overlap between formal demography and population studies in terms of concepts, methods, and data, but the distinction, nonetheless is useful.

Applied demography's two distinct subsets are private sector demography and public sector demography. Both use the same methods, some of which are unique to applied demography, but also include some of the methods found in formal demography and many of the methods found in population studies. Private sector and public sector demography both use a great deal of data generated in the public domain, but because private sector data is too costly or proprietary, little of its data is even known within public sector demography, much less used by it.

As presently practiced around the world, applied demography largely owes its present configuration to two major factors, largely initiated in the United States: (1) the need by government to have data to develop policies and implement them; and (2) the need by business to have data to guide its investment, production, and marketing efforts.

Although governments have long used census data, it was the advent of U.S. government policy-making under the administration of President Franklin Roosevelt in the 1930s that set the stage for the need for data beyond the census, which, in turn, kicked off the move by governments at all levels to generate and acquire data for policy and administrative needs, both within and outside of the United States (Prewitt, 2012). The utility of low-cost, timely, and useful data being generated by the U.S. government was quickly recognized by the private sector. The private sector demand for such data soon outpaced

what could be provided by the government and by the 1970, statistics became a commodity independent of government and a statistical services industry developed, an industry in which “demographics” found itself playing a key role (Martins, Yusuf and Swanson 2011).

2. Applied Demography in the Public Sector

Although there is overlap, the origin of applied demography in the public sector precedes its establishment in the private sector. In 1943, the state of Washington established the Washington State Census Board, which in of itself was not new since many states had conducted their own census counts in the late 19th and early 20th century. However, the act (House Bill 72, Chapter 81, Revised Code of Washington) establishing the board set the stage for the generation of annual population estimates (something that was, in fact, new) rather than census counts as a way to equitably allocate funds to incorporated cities struggling under the impact of huge population increases resulting from the entrance of the United States into World War II in 1941. The Board immediately starting producing estimates (Washington State Census Board, 1944) and the process of developing annual population estimates for incorporated towns was soon on the path to being institutionalized at the University of Washington under the direction of Professor Calvin F. Schmid, who was selected as one of the Board’s initial members.

By the 1950s, the Washington State Census Board was not only producing annual population estimates of the state’s incorporated towns, but also population and enrollment projections. The utility of these activities was not missed by other states (and Canadian provinces) and California, Oregon, Alberta, British Columbia, among other sub-national governments started establishing their own demographic units. This process was greatly assisted by the fact that many of the graduate students who worked with the Washington State Census Board at the University of Washington and moved into positions in these adjoining areas after completing their degrees. The state of Washington ultimately absorbed the Census Board directly into state government and today its legacy lives on with the forecasting unit of the Office of Financial Management, which is the Governor’s Budget Office.

By the late 1940s, the US Census Bureau also started producing annual estimates for states and other subnational areas and by the 1950s, it was producing population projections on a regular basis. Since both the federal government and several states were producing population estimates for the same areas, it should not be surprising that in the early 1950s, an informal movement took hold that was aimed at coordinating these activities.

In 1966, the National Governor’s Conference, in cooperation with the Council of State Governments, initiated and sponsored the ‘First National Conference on Comparative Statistics,’ held in Washington, D.C. This conference gave national recognition to the increasing demand for subnational population estimates. Between 1967 and 1973, a

group of Census Bureau and state employees charged with developing annual subnational population estimates, formalized the "FSCPE," the Federal-State Cooperative Program for Local Population Estimates (U.S. Census Bureau, no date). Jumping off a task force formed within the FSCPE, a little more than ten years later, a similar organization (The Federal-State Cooperative Program for Population Projections) was established to coordinate population projection efforts.

Although many states reduced or eliminated their demographic activities between the heyday these activities in the 1970s and the severe economic recession of 2007-2012, the original core states of Washington, Oregon, and California still have highly functional and well-respected demographic operations, as do the states of Alaska, New Mexico, Texas, and Florida, and the provinces of Alberta, British Columbia and Ontario, among others.

Demographic activities in public sector also are found within sub-state governmental units. Typically, these are in the planning departments of large cities and regional organizations such as Metropolitan Planning Organizations (also known as Councils of Government). The regional organizations often run very sophisticated demographic operations. One notable example is the San Diego Association of Governments, which hosts an annual research conference for demographers working in these regional organizations.

3. De facto Population Estimates.

By now you may have realized that the discussion of both private and public sector activities has been in terms of the definition of population used by the US Census Bureau, namely, the "De Jure" population. This is the idea that in a census everybody should be counted once, only once, and in the right place (Cork and Voss, 2006). It is based on place of "usual residence." However, important to both the private and public sectors is another definition, namely the "De Facto" population. This is the idea that in a census you count everybody once, only once, but in the place where they are found at the time of the census (Swanson and Tayman, 2011). Examples of De Facto populations are many. They include vacationers (of interest, for example, to the hotel owners in Cancun, the casino industry in Macao, and the Hawaii Visitors Bureau), migratory workers (of interest, for example, to health care, school, and other social service providers), and the people who work in the central business district of a large city each day, but leave it largely vacant in the evenings (of interest to the San Francisco City Planning Office, for example).

While estimates of De Facto populations are of great interest, they are difficult to make in countries that use the De Jure concept of residency for their census counts. In addition, they are also difficult to evaluate in these countries because there is no "gold standard" against which to measure them in terms of validity and reliability (Swanson and Tayman, 2011).

4. Professional Recognition.²

As you have read, by the end of the 1970s, applied demographers in the public sector had a history of interaction and were involved in formal organizations that facilitated the advancement of the field. The federal-state cooperative programs for population estimates and projections, respectively, were instrumental in this regard. Demographers in the private sector were more isolated from one another and their colleagues in the public sector. Partly, this was due to the proprietary nature of their work and partly to the slow pace of hiring demographers on the part of major companies.

One affiliation that was shared between applied demographers in the private sector and their colleagues in the public sector was and public sectors changed all that in the late 1970s. The organization was the Population Association of American (PAA), arguably the world's largest single professional association for demographers of all stripes.

Founded in the 1930s, the PAA was almost entirely made up of basic demographers until the 1960s, when applied demographers started showing up at its conferences. By 1975, Harry Rosenberg, who was moving from the University of North Carolina to the U.S. Center for Health Statistics, wrote to the then-president-elect, Sidney Goldstein, of PAA urging him to include a session in the 1976 conference on state and local demography. While the letter came too late to have a session on state and local demography, it resulted in the first of an annual set of "breakfast meetings." By 1977, a formal session on state and local demography was included in the PAA's annual conference, as was the case in 1978, which also saw the first appearance of the official PAA Committee on State and Local Demography.

With annual breakfast and regular sessions, the "state and local demographers" were soon joined by their colleagues in the private sector and by the early 1980s, a Committee on Business Demography was spun-off by the Committee on State and Local Demography. The two committees then joined forces to launch the "Applied Demography" newsletter under the auspices of the PAA. By 1993, the two separate committees merged to form the PAA's official Committee on Applied Demography, which continues to sponsor not only the annual breakfast but also an evening reception and several sessions in each of the annual PAA conferences. In addition to about 125 members who specialize in estimates and projections, the PAA has around a hundred members who specialize in business or state and local demography.

A separate track to professional recognition was provided by the Southern Demographic Association (SDA), which from its founding in 1970 (as the Southern Demographic Interest Group) was focused on applied demography. This organization was initially sponsored by the Oak Ridge National Laboratory (located near Knoxville, Tennessee) and its associated universities. Contact was made between Oak Ridge and Professor

Everett Lee at the University of Georgia in regard to developing current population estimates that could be used for emergency planning, especially the evacuation of people from large population centers in the event of nuclear war. Like the Population Association of American, this group held an annual conference at which demographers congregated and it quickly attracted the interest of applied demographers located in or near the southern region of the United States. Over time, this regional organization has grown to include members from outside the southern region of the United States.

The SDA began publishing upon its founding and eventually acquired a journal, *Population Research and Policy Review*, which became a publication outlet for many applied demographers. In addition to its journal, the SDA sponsors the Walter E. Terrie award, which is given to the author(s) of the best paper on applied demography presented at its annual meeting. This is the only award given anywhere in the world specifically for a contribution to applied demography.

Perhaps the apex of professional activity and recognition is found in the form of the biennial conference on applied demography, which is sponsored and hosted by the University of Texas, San Antonio every other January since 2008. This conference filled a fifteen-year hiatus that resulted when the applied demography conferences started at Bowling Green State University in 1986 were discontinued in the 1990s. Selected papers from this conference are published in a proceedings book by Springer, which is edited by faculty members in the Department of Demography and staff at the Texas State Demographic Center, both of which are housed within the University.

5. Training

Training in applied demography has both a formal education component and an on-the-job component. For the most part, applied demographers have a bachelor's degree in one of the social sciences, typically sociology and geography. Many universities offer courses in applied demography, but at the undergraduate level there are neither formal degrees nor concentrations offered.

At the graduate level, however, there are several programs in addition to many individual courses. The University of California Irvine offers a one year program in applied demography that leads to a Master's Degree. A similar program is offered by Florida State University while The University of Texas, San Antonio offers a Ph.D. in applied demography. An entrance requirement to this program is possession of a Master's degree, but it need not be in applied demography. The graduate programs typically include courses on data sources, geographic information systems and methods for estimating and projecting populations. Information on the courses and other requirements of these programs can be found at the website of the universities where the programs are offered.

6. Summary

The development of applied demographic has been driven by the interaction of several elements that have shaped the nature of certain streams of research in demography. The

first is the rise in the use of the demographic perspective, data and methods in addressing business opportunities and problems. Encouraged in part by the need for small area data, many demographers more recently have focused their efforts on the improvement of techniques and technology needed to generate, display, and analyze small area data, both for the private and the public sectors. While the vast majority of demographic research focuses on the demography of geographic units, it is worthwhile to note that an interest in organizational demography and other non-geography-based applications has emerged in the last decade or so.

The development of data through estimation and projection (particularly for small areas) has and will continue to be affected by continued improvements in methods and technology. Although the focus here has been on applied demography in the United States, developments in methodology and technology transcend national boundaries. These developments will, in turn, influence both applied demography not only in the United States, but elsewhere.

Endnotes

1. A population estimate is the calculation of a current or past population, typically based on symptomatic indicators of population change while a population projection is the numerical outcome of a particular set of assumptions regarding future population trends (Swanson and Stephan, 2004). It is worthwhile to add here that there is a distinction usually made between the term “projection” and the term “forecast,” with the latter being defined as a population projection deemed most accurate for the purpose of predicting future population (Swanson and Stephan, 2004).

It also is useful to note here that there are two distinct traditions in regard to population estimates (1) demographic; and (2) statistical. 1 – that is, the methods used by those who do sample surveys. Demographic methods are used to develop estimates of a total population as well as the ascribed characteristics – age, race, and sex - of a given population. Statistical methods typically employ sample surveys in order to estimate the achieved characteristics of a population – educational attainment, employment status, income, and marital status, for example. Among survey statisticians, the demographer’s definition of an estimate is generally termed an “indirect estimate” because unlike a sample survey, the data used to construct a demographic estimate are symptomatic indicators of population change (e.g., K-12 enrollment data, births, deaths,) and do not directly represent the phenomenon of interest. Among demographers, however, the term “indirect estimate” has a different meaning (Swanson and Stephan, 2004). Most national statistical agencies produce estimates using both traditions, demographic and statistical. In regard to population projections, the distinction between the demographic tradition and the statistical tradition is less pronounced, however.

2. The information about the PAA’s Committee on Applied Demography is largely drawn from Voss (2005).

References

- Cork, D., and P. Voss. 2006. *Once, Only Once, and in the Right Place: Residence Rules in the Decennial Census*. Washington, D.C.: The National Academies Press.
- Martins, J., F. Yusuf, and D. Swanson. 2011. *An Introduction to Consumer Demographics and Behaviour: Markets are People*. Springer B.V. Press. Dordrecht, Heidelberg, London, and New York.
- Prewitt, K. 2013. The 2012 Morris Hansen Lecture: Thank You, Morris, et al., For Westat, et al. *Journal of Official Statistics* 29 (2): 223–231.
- Swanson, D. and G. E. Stephan. 2004. “Glossary and a Demography Timeline” pp. 751-786 in J. Siegel and D. Swanson (Eds.) *The Methods and Materials of Demography, 2nd Edition*. San Diego, CA: Elsevier Academic Press.
- Swanson, D. and J. Tayman. 2011. “On Estimating a De Facto Population and its Components.” *Review of Economics and Finance* 5:17-31
- Swanson, D., T. Burch, and L. Tedrow. 1996. “What Is Applied Demography?” *Population Research and Policy Review* 15 (5-6): 403-418.
- U.S. Census Bureau. (no date). “FSCPE Overview” (<https://www.census.gov/popest/fscpe/overview.html>)
- U. S. Census Bureau. 2009. “Geographic Mobility by Selected Characteristics in the United States .” S070. 2009 American Community Survey. (available online at http://factfinder.census.gov/servlet/STTable?_bm=y&-qr_name=ACS_2009_1YR_G00_S0701&-geo_id=01000US&-ds_name=ACS_2009_1YR_G00_&-_lang=en&-format=&-CONTEXT=st).
- Voss, P. 2005. “History of the Committee on Applied Demography.” (<http://www.populationassociation.org/about/committees/about-cad/>)
- Washington State Census Board. 1944. *Report of the Washington State Census Board for the Years 1943 and 1944*. Olympia, Washington: Washington State Printing Plant.

Suggested Readings

This list contains historical articles considered as seminal methodological contributions to the field of applied demography (i.e., Bogue, 1950; Cannan, 1895; Hamilton and Perry, 1962; Hardy and Wyatt, 1911; Schmidt and Crosetti, 1954; and Snow, 1911).

- Bogue, D. 1950. “A Technique for making Extensive Population Estimates.” *Journal of the American Statistical Association* 45(June): 149-163.
- Bongaarts, J. and R. Bulatao. (Editors). 2000. *Beyond Six Billion: Forecasting the World's Population*. Washington, D.C.: National Academy Press
- Bryan, T. 2004. “Population Estimates.” pp. 523-560 in J. Siegel and D. Swanson (Editors.) *The Methods and Materials of Demography, 2nd Edition*. New York City, NY: Elsevier Academic Press.
- Cameron, M. and J. Poot. 2011. “Lessons from Stochastic Small-area Population Projections: The case of Waikato Subregions in New Zealand.” *Journal of Population Research* 28: 245-265.

- Cannan, E. 1895. "The Probability of a Cessation of Growth in England and Wales during the Next Century." *The Economic Journal* 5(2): 505-515.
- Carroll, G., and M. Hannan. 2004. *The Demography of Corporations and Industries*. Princeton, NJ: Princeton University Press.
- De Gans, H. 1999. *Population Forecasting 1895-1945: The Transition to Modernity*. Dordrecht, the Netherlands: Kluwer Academic Publishers
- Gauthier, A., Chu, C.Y.C. and Tuljapurkar, S. (Eds.) (2006). *Allocating public and Private Resources across Generations: Riding the Age Waves, Vol. 2*. Dordrecht, the Netherlands: Springer.
- George, M., S. Smith, D. Swanson, and J. Tayman. 2004. "Population Projections." pp. 561-601 in J. Siegel and D. Swanson (Editors) *The Methods and Materials of Demography, 2nd Edition*. Academic/Elsevier Press: Los Angeles.
- Hamilton, C. H. and J. Perry. 1962. "A short method for Projecting Population by Age from one Decennial Census to Another." *Social Forces* 41: 163-170.
- Hardy, G. and F. Wyatt. 1911. "Report of the Actuaries in Relation to the Scheme of Insurance against Sickness, Disablement, etc." *Journal of the Institute of Actuaries* XLV: 406-443.
- Hollmann, F., T. Mulder and J. Kallan. "Methodology and Assumptions for the Population Projections of the United States: 1999 to 2100." *Population Division Working Paper No. 38*. Washington, D.C.: U.S. Bureau of the Census, January 13, 2000.
- Hoque, N. and D. Swanson (Editors). 2012. *Opportunities and Challenges for Applied Demography in the 21st Century*. Springer B.V. Press. Dordrecht, Heidelberg, London, and New York .
- Judson, D. and D. Swanson. 2011. *Estimating Characteristics of the Foreign-Born by Legal Status: An Evaluation of Data and Methods*. Springer Briefs in Population Studies, Volume 2, Springer, B.V. Press. Dordrecht, Heidelberg, London, and New York.
- Kintner, H. and D. Swanson. 1996. "Ties That Bind: A Case Study of The Link Between Employers, Families and Health Benefits." *Population Research and Policy Review* 15(5-6): 509-523.
- Kintner, H., T. Merrick, P. Morrison, and P. Voss. 1994. *Demographics: A Casebook for Business and Government*. Boulder, CO: Westview Press.
- Long, J. 1993. "An Overview of Population Estimation Methods." pp 20-1 to 20-5 in D. Bogue, E. Arriaga, and D. Anderton (Eds.) *Readings in Population Research Methodology* (Vol. 5), Chicago: United Nations Population Funds and Social Development Center.
- McVey, W. 1974. *An Empirical Assessment of a Modified Censal Ratio Estimation Technique*. Ph.D. Dissertation, Department of Sociology, University of Alberta, Edmonton, Alberta, Canada.
- Moen, E. 1984. "Voodoo Forecasting: Technical, Political, and Ethical Issues Regarding the Projection of Local Population Growth." *Population Research and Policy Review* 3: 1-25.
- Murdock, S., and D. Ellis. 1991. *Applied Demography*. Boulder, CO. Westview Press.

- Murdock, S., M. N. Hoque, M. Michael, S. White and B. Pecotte. 1997. *The Texas Challenge: Population Change and the Future of Texas*. College Station, TX: Texas A&M University Press.
- Murdock, S. and D. Swanson. (Editors) 2008. *Applied Demography in the 21st Century*. Dordrecht, the Netherlands: Springer B.V. Press..
- Myers, D. (Editor). 1990. *Housing Demography: Linking Demographic Structure and Housing Markets*. Madison, WI: University of Wisconsin Press.
- Pittenger, D. 1978. "The role of Judgment, Assumptions, Techniques, and Confidence Limits in Forecasting Population." *Socio-Economic Planning Sciences* 12: 271-276.
- Plane, D., and P. Rogerson. 1994. *The Geographical Analysis of Population, with Applications to Planning and Business*. New York City, NY: John Wiley and Sons
- Pol. L., and R. Thomas. 2000. *The Demography of Health and Health Care, 2nd Edition*. Dordrecht, the Netherlands: Springer B.V. Press.
- Pol. L., and R. Thomas. 1997. *Demography for Business Decision Making*. New York, NY: Praeger.
- Popoff, C., and D. Judson. 2004. "Some Methods of Estimation for Statistically Underdeveloped Areas." Pp. 603-641 in J. Siegel and D. Swanson (Editors) *The Methods and Materials of Demography, 2nd Edition*. Amsterdam,
- Preston, S. 1993. "The Contours of Demography: Estimates and Projections." *Demography* 30 (4): 593-606.
- Purcell, N. and L. Kish. 1980. "Post-censal Estimates for Local Areas (or Domains)." *International Statistical Review* 48 (1): 3-18.
- Rives, N. ., W. Serow, A. Lee, H. Goldsmith, and P. Voss (Eds.) *Basic Methods for Preparing Small-area Population Estimates*. Madison, WI: Applied Population Laboratory, University of Wisconsin
- Schmitt, R., and A. Crosetti. 1954. "Accuracy of the Ratio-correlation Method for Estimating Post-censal Population." *Land Economics* 30: 279-281
- Siegel, J. 2002. *Applied Demography: Applications to Business, Government, Law, and Public Policy*. San Diego, CA: Academic Press.
- Simpson, S., I. Diamond, P. Tonkin, and R. Tye. 1996. "Updating Small Area Population Estimates in England and Wales." *Journal of the Royal Statistical Society, Series A*, 159 (part 2): 235-247
- Simpson, S., E. Middleton, I. Diamond, and D. Lunn. 1997. "Small-area Population Estimates: A Review of Methods used in Britain in the 1990s." *International Journal of Population Geography* 3 (3): 265-280.
- Singh, M., M. Hidioglou, J. Gambino and M. Kovačević. 2001. "Estimation Methods and Related Systems at Statistics Canada." *International Statistical Review* 69 (3): 461-485.
- Smith, S. K. 1989. "Toward a Methodology for Estimating Temporary Residents." *Journal of the American Statistical Association* 84: 430-436.
- Smith, S., J. Tayman, and D. Swanson. 2013. *A Practitioner's Guide to State and Local Population Projections*. Springer B.V. Press. Dordrecht, Heidelberg, London, and New York.
- Snow, E. C. 1911. "The Application of the Method of Multiple Correlation to the Estimation of Post-censal Populations." *Journal of the Royal Statistical Society* 74 (part 6): 575-620.

- Statistics Canada. 1987. *Population Estimation Methods, Canada*. Ottawa, Ontario, Canada: Ministry of Supply and Services.
- Swanson, D. 2009 "Hurricane Katrina: A Case Study of Its Impacts on Medical Service Providers and Their Client Populations." *The Open Demography Journal* 2: 8-17.
- Swanson, D. 2008. Population Estimation: An Annotated Bibliography and Glossary. Working Paper 08-01, Center for Sustainable Suburban Development, University of California Riverside (<http://cssd.ucr.edu/Papers/PDFs/1-Population%20Estimation.pdf>)
- Swanson, D. 2004 "Advancing Methodological Knowledge within State and Local Demography: A Case Study." *Population Research and Policy Review* 23 (August): 379-398.
- Swanson, D. and G. Hough. 2012. "An Evaluation of Persons per Household (PPH) Data Generated by the American Community Survey: A Demographic Perspective." *Population Research and Policy Review* 31: 235-266.
- Swanson, D. and J. McKibben. 2010. "New Directions in the Development of Population Estimates in the United States?" *Population Research and Policy Review* 29 (6): 797-818 (with J. McKibben).
- Swanson, D. and J. McKibben. 1997. "Linking Substance and Practice: A Case Study of the Relationship Between Socio-Economic Structure and Population Estimation." *Journal of Economic and Social Measurement* 24: 135-147.
- Swanson, D. and P. Morrison. 2010. "Teaching Business Demography Using Case Studies". *Population Research and Policy Review* 29 (1): 93-104.
- Swanson, D. and L. Pol. 2005. "Contemporary Developments in Applied Demography within the United States." *Journal of Applied Sociology* 21 (2): 26-56.
- Swanson, D. and J. Tayman. 2012. *Subnational Population Estimates*. Springer B.V. Press. Dordrecht, Heidelberg, London, and New York.
- Swanson, D. and P. Walashek. 2011. *CEMAF as a Census Method: A Proposal for a Re-Designed Census and an Independent Census Bureau*. Springer Briefs in Population Studies, Volume 1, Springer, B.V. Press. Dordrecht, Heidelberg, London, and New York
- Swanson, D. and F. Yusuf. 2010. "Business Demography in the 21st Century." *Population Research and Policy Review*. 29 (1): 1-3
- Swanson, D., A. Schlottmann, and R. Schmidt. 2010. "Forecasting the Population of Census Tracts by Age and Sex: An Example of the Hamilton-Perry Method in Action." *Population Research and Policy Review* 29 (1): 47-63.
- Swanson, D., R. Forgette, J. McKibben, M. Van Boening, and L. Wombold. 2009. "The Socio-Demographic and Environmental Effects of Katrina: An Impact Analysis Perspective". *The Open Demography Journal* 2 (11): 36-46.
- Swanson, D., G. Hough, C. Clemans, and J. Rodriguez. 1998. "Merging Methods and Judgment for K-12 Enrollment Forecasting." *Educational Research Service Spectrum* 16 (Fall): 24-31
- Swanson, D., G. Hough, D. Lycan, and I. Sharkova, 1997. "Forecasting For School Attendance Zone Changes: Merging GIS and Demographic Methods With Local Expert Judgment." *Market and Demographic Analysis* 3(6): 23-31(in Chinese).

Wilson, T. 2012. "Forecast Accuracy and Uncertainty of Australian Bureau of Statistics State and Territory Population Projections. *International Journal of Population Research*. Article ID 419824.