



# Global paper market forecasts to 2030 under future internet demand scenarios



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## ABSTRACT

The Global Forest Products Model (GFPM) was applied to forecast the effect of increased per capita Internet adoption on the global paper products industry to 2030. Two scenarios were examined: (a) full per capita Internet adoption by 2100, and (b) more rapidly by 2050. Global newsprint consumption is estimated to be 34.2–37.1 million tonnes lower in 2030 than in the US Forest Service 2010 Resources Planning Act report, and the 2010 report from the Food and Agriculture Organization of the United Nations. Similarly, global printing and writing paper consumption is forecasted to be 76.7–87.1 million tonnes lower by 2030. By including controls for per capita Internet use in the demand equations for print based media, this article reflects the recent declines in global paper product consumption. Out-of-sample forecasts over a two-year period indicate global model prediction errors from 0 to 3%, depending on the product and exogenous assumptions. The results highlight the importance of considering market evolution in long-term global forecasting, and a failure to account for future rates of Internet adoption will result in an upward bias on paper product market forecasts.

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## Introduction

The demand for paper products has received considerable attention in recent years as we continue to observe declining demand for newsprint and printed materials after decades of growth (see Fig. 1). The Internet, together with other technological advances, have provided an electronic substitute to newspapers and printed materials. In the early 1990s, the demand for paper in communication was found to be statistically independent of these electronic substitutes (e.g. Miller Freeman Inc., 1995, p. 146; Zhang and Buongiorno, 1997). Yet, by the end of the decade, slowing growth of newsprint consumption was beginning to be attributed to technological advancement (Hetemäki, 1999) leading some to report pessimistic forecasts of paper markets (Boston Consulting Group, 1999). In more recent years, evidence has been mounting that a structural shift has indeed occurred in communication consumption patterns (Hetemäki and Obersteiner, 2001; Hetemäki, 2005, 2008; Szabó et al., 2009), as preferences have shifted away from paper products and toward electronic media as populations adopt

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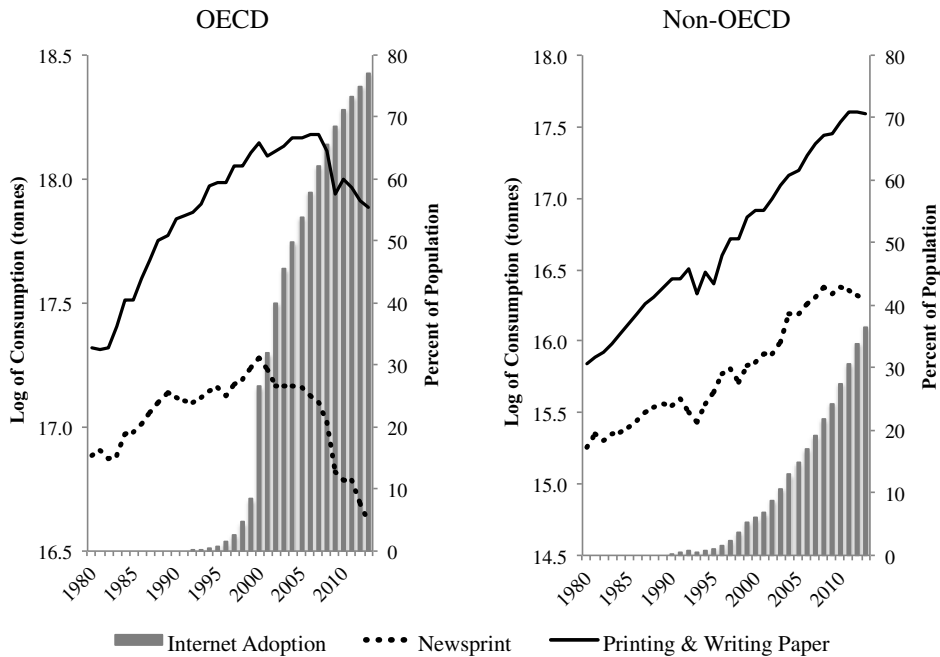


Fig. 1. Observed newsprint consumption, printing and writing paper consumption, and Internet adoption for OECD and non-OECD regions, 1980–2013.

the Internet (Hujala, 2011; Latta et al., 2016). Now, it is increasingly recognized that failing to account for this structural shift will likely bias estimates of the evolution of the paper products industry.

This has important implications for forest sector outlook studies (Hurmekoski and Hetemäki, 2013). The Food and Agriculture Organization of the United Nations (FAO) and the US Forest Service, regularly produce long-term forest product projections, which include projections of global newsprint and printing and writing paper consumption. The 1999 FAO report (Zhu et al., 1998) failed to account for any Internet effects, and forecasted global demand for newsprint and printing and writing paper to continue to rise steadily from mid-1990s levels. The 2000 Resource Planning Act (RPA) report (Haynes, 2003) assumed that consumers would shift their preferences away from newsprint towards electronic media and forecasted a more modest future growth path in global newsprint and printing and writing paper consumption. Ten-years later, the most recent outlook studies are the 2010 RPA report (Buongiorno et al., 2012) and 2010 FAO report (Prestemon and Buongiorno, 2012), which present the same forecasts in newsprint and printing and writing paper. While the 2010 RPA and FAO reports integrate controls for advertising spending in print and electronic media (Ince et al., 2011), their projections seem far too optimistic.

One of the key assumptions behind forest sector outlook studies is that the causal relationship found in past trends is assumed to carry forward indefinitely. Outlook studies by the FAO and RPA continue to assume a consistent positive relationship between per capita income (GDP) and the demand for paper products, while studies questioning the robustness of this assumption have been around for over a decade (Hetemäki, 1999; Hetemäki and Obersteiner, 2001; Bolkesjø et al., 2003). In fact, some have argued that newsprint has transitioned into an inferior good; newsprint demand now declines with growth in income (Hetemäki, 2005). Hurmekoski and Hetemäki (2013) note “Although this structural change is increasingly acknowledged, it has not lead to change in the demand equations and their interpretation in forest sector outlook studies”. Indeed, it is this change that is the scope of this study.

The purpose of this article is to forecast the effect of the Internet on the global paper product markets to 2030. To achieve this objective, this article improves upon two sources of uncertainty: (1) assumptions regarding demand elasticities for paper products, and (2) assumptions regarding exogenous variables. In particular, this paper employs a more detailed demand equation for newsprint and printed materials used in communications to take into account future rates of growth of both per capita Internet adoption, and GDP. With this in place, it is possible to obtain a more accurate reflection of country specific structural breaks in paper markets that are contingent on future growth paths of income and technology adoption.

The next section establishes the methodological framework including a discussion of the assumptions employed regarding future rates of per capita Internet adoption. The following section compares the results to other long-term forest products projections, highlighting the importance of integrating per capita Internet adoptions rates into the demand equations. Finally, detailed country level effects are presented, followed by concluding remarks.

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