

## WEB APPENDIX

### **The Role of National Culture in Advertising's Sensitivity to Business Cycles: An Investigation Across Continents**

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#### **ROBUSTNESS CHECKS**

We assess the robustness of our findings in several ways. First, given that business-cycle filters *approximate* the true business cycle, we evaluate the sensitivity of our findings to alternative filter specifications. Second, we test endogenously for the presence of an additional break point in the derivation of the long-run and cyclical components. Third, we assess the stability of the co-movement estimates over the considered 25 year time span. Fourth, we examine whether the emergence of Internet advertising from the late 1990s onward affects our conclusions. Finally, we consider whether our results could be a statistical artifact (i.e., correlation by construction), as the advertising industry is one of the sectors that make up a country's GDP.<sup>1</sup>

#### ***Alternative Smoothing Parameters***

We followed the recommendation of Baxter and King (1999) for annual data, and set our smoothing parameter  $\lambda$  equal to 10. However, different values of  $\lambda$  result in slightly different cyclical elements with different amounts of error or noise. This offers a convenient way to examine the sensitivity of our key insights to alternative values of  $\lambda$ . We conducted additional analyses using a wide range of alternative  $\lambda$  values, varying between 50% and 500% of its original value. As shown in Table W1, the empirical generalization on the average magnitude of the co-movement elasticity is robust. Also the

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<sup>1</sup> Detailed results on all robustness analyses are available from the first author upon request.

direction, magnitude and significance of the various hypothesized effects remain largely unchanged, the exception being that the effect of LTO and the control variable importance of foreign-owned subsidiaries became marginally significant for the lower extreme of  $\lambda=5$ . Note, however, that this model also exhibited the lowest model fit.

### ***Additional Structural Breaks in State-Space Representation***

We controlled for the introduction of commercial television in our sample period. Using the SupWald test (Vogelsang 1997), we tested endogenously for the presence of an additional break in each national advertising series' trend component. In line with Kornelis et al. (2008), we considered every location in the  $[0.15T, 0.85T]$  interval. No evidence is found to support the inclusion of additional pulse dummies in Equation (4).

### ***Stability of Co-movement Estimates***

To assess the over-time stability of the co-movement elasticities in Equation (5), three additional analyses were performed. First, the length of the available time period varied between 17 and 25 years. We added a covariate to Equation (6) indicating the number of years used to estimate the corresponding co-movement estimate. This moderator turns out to be insignificant ( $p > .10$ ), while none of our other conclusions are affected.

Second, we omitted the first (last) four years from the 85 country-media combinations where 25 years of data were available, and re-estimated the co-movement elasticities on a sample from 1984 through 2004 (1980 through 2000). These new estimates were subsequently used to estimate Equation (6). The average co-movement elasticity is, respectively, 1.39 and 1.26. As indicated before, a value of 1.39 was found when working with all available data. In terms of Equation (6), the same significant hypothesized findings emerge, as shown in the last two columns of Table W1.

Finally, for the 85 series with 25 years of data, a Chow stability test was used comparing the first and second half of the sample. At a 10% significance level and using the Bonferroni correction to account for multiple media tests within countries, the null hypothesis of parameter stability is rejected in only 7 (8%) series, which is less than would be expected by chance.

These three analyses provide evidence that the co-movement elasticity is stable over the time span considered.

### ***Internet Advertising***

In the last decade, the Internet has emerged as a major new advertising medium. Internet advertising depends less on contractual agreements (Silk, Klein and Berndt 2001), and may therefore be more easily adjusted in response to business-cycle fluctuations. We could not include Internet advertising as a separate medium due to a lack of time series of sufficient length. However, for 2004, WARC reported which 30 countries had the highest per-capita spending on internet advertising. Based on this information, we could perform a median split of the countries in our sample, and added a dummy variable reflecting this division as additional control variable to Equation (6). The associated parameter is not significant ( $p > .10$ ), and none of our substantive findings (obtained on the basis of the co-movement elasticity of the four more traditional media) are affected.

### ***Correlation by Construction***

Our specification in Equation (5) is consistent with earlier research by Ashley, Granger and Schmalensee (1980) and Quarles and Jeffres (1983), showing that the economy drives advertising spending, rather than the other way around. Still, the

advertising industry is one of the many industries that make up the economy as a whole. Even though advertising spending was, as indicated before, at most 3.07% of GDP, one could argue that this may result in a correlation by construction (Christiano and Fitzgerald 1998). To address this issue, three analyses were conducted.

First, we removed the advertising expenditures of every country-media combination from the country's aggregate GDP. The average co-movement elasticity obtained with this new measure of economic activity is 1.37 (as compared to the original 1.39), while the moderator analysis yields the same significant results. Second, we subtracted a country's total advertising spending from its GDP series. The corresponding average co-movement elasticity with this second "adjusted" measure of economic activity is 1.36, while the moderator analysis yields again the same results. Third, we added the country's advertising intensity (Advertising/GDP) to Equation (6) as a measure for the importance of the advertising sector. The same substantive insights as before are obtained, while the parameter estimate for advertising intensity is not significant ( $p > .10$ ).

#### **REFERENCE NOT INCLUDED IN THE MAIN TEXT**

Vogelsang, Timothy (1997), "Wald-Type Tests for Detecting Shifts in the Trend Function of a Dynamic Time Series," *Econometric Theory*, 13, 818-849.

**Table W1: Robustness checks**

	Variation in smoothing parameter										Exclude first/last years			
	$\lambda=5$		$\lambda=7.5$		$\lambda=10$		$\lambda=20$		$\lambda=50$		1984-2004		1980-2000	
<b>Average comovement elasticity:</b>	1.42		1.40		1.39		1.35		1.31		1.39		1.26	
<b>Parameter estimates Eq.(6)<sup>1</sup></b>	coeff	<i>p</i> -value <sup>2</sup>	coeff	<i>p</i> -value	coeff	<i>p</i> -value	coeff	<i>p</i> -value	coeff	<i>p</i> -value	coeff	<i>p</i> -value	coeff	<i>p</i> -value
<b>Cultural factors</b>														
Long-term orientation	-.01	.13	-.01	.08	-.02	.04	-.02	.02	-.01	.09	-.02	.09	-.02	.08
Power distance	-.02	.05	-.02	.04	-.02	.02	-.02	.02	-.01	.10	-.02	.10	-.02	.05
Uncertainty avoidance	.02	.01	.02	.01	.02	.00	.02	.00	.02	.00	.02	.05	.02	.02
Collectivism	-.01	.89	-.01	.84	-.01	.83	-.01	.79	-.01	.84	-.01	.73	.00	.46
<b>Control variables</b>														
Stock market pressure	.83	.04	.81	.04	.82	.02	.80	.02	.82	.03	.73	.25	.87	.06
Importance of foreign-owned subsidiaries	-.06	.18	-.08	.06	-.08	.04	-.10	.01	-.11	.00	-.11	.10	-.07	.15
Real income per capita	.00	.86	.00	.97	.00	.88	.01	.66	.00	.93	.01	.71	.01	.73
<b>R<sup>2</sup> of Eq.(6)</b>	29%		32%		35%		37%		33%		28%		28%	

<sup>1</sup> Reported are unstandardized regression coefficients.

<sup>2</sup> *p*-values are one-sided for directional hypotheses related to the cultural factors (as indicated in Table 3), two-sided otherwise.