THE EFFECT OF TAX MOTIVATED PAPER SHIFTING ON THE INFORMATIVENESS OF AGGREGATE ACCOUNTING EARNINGS FOR MACROECONOMIC OUTCOMES: EVIDENCE FROM GDP GROWTH

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ABSTRACT

This paper examines whether tax-motivated paper shifting reduces the informativeness of aggregate accounting earnings for future GDP growth. Aggregate accounting earnings, especially the earnings of large companies, convey information about future GDP growth. Many large companies are multinational companies (MNCs) whose earnings include domestic and foreign components. I document that aggregate domestic and foreign earnings growth have different associations with future GDP growth. MNCs can shift income by changing where income is reported without changing income-producing activities. Such "paper shifting" distorts the link between reported domestic and foreign accounting earnings and economic activities. I develop a method to identify paper shifting and find paper shifting reduces the ability of aggregate domestic and foreign earnings growth to predict future GDP growth. These findings advance our understanding of the consequences of tax-motivated income shifting and have implications for policymakers considering initiatives to increase tax transparency. In addition, these findings shed light on how to improve GDP growth forecasts, which inform decisions of governments and businesses.

I dedicate this dissertation to my dear husband Yan and wonderful daughter Mia. Thank them for being there for me throughout the entire doctorate program.

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1. INTRODUCTION

This paper examines whether tax-motivated income shifting impairs the ability of aggregate accounting earnings to predict future gross domestic product (GDP) growth. Multinational companies (MNCs) shift income from high-tax to low-tax jurisdictions to lower their overall tax burdens.[1] The Organization for Economic Co-operation and Development (OECD) estimates that countries lose $100 to $240 billion in annual revenue due to base erosion and profit shifting. This is equivalent to four to ten percent of global corporate income tax revenue (OECD 2015). In light of its substantial magnitude and the challenges it poses for the global tax system, understanding the consequences of tax-motivated income shifting is critical for researchers and policymakers. One consequence of tax-motivated income shifting that has not been explored is the potential negative externality it generates for the ability of aggregate accounting earnings to predict future macroeconomic outcomes, such as GDP growth, which I refer to as the "informativeness" of aggregate accounting earnings.

Recent accounting research examines the relation between aggregate accounting earnings, asset prices, and macroeconomic activities. Historically, the accounting literature focused on firm-level analyses to examine the capital market implications of earnings and other accounting measures. However, these analyses ignore the fact that holding diversified portfolios makes investors at least partially, and potentially completely, immune to various firm-level properties of earnings (Ball and Sadka 2015). Hence, the inferences drawn from firm-level analyses may not hold in aggregate-level analyses, motivating the separate examination of aggregate accounting earnings. Because of the importance of GDP growth forecasts to decisions

[1] MNCs can shift income by locating profitable operating activities in low-tax jurisdictions ("real shifting") or reporting income in low-tax jurisdictions without changing economic activities ("paper shifting"). I focus on paper shifting in this study.

made by governments and business leaders, extant literature analyzes the relation between aggregate accounting earnings and future GDP growth.[2] The results from these analyses show aggregate accounting earnings contain information that predicts future GDP growth.[3] However, the effect of taxes on the relation between aggregate accounting earnings and future GDP growth remains underexplored. In light of the substantial magnitude of tax-motivated income shifting, whether and how tax-motivated income shifting impacts the informativeness of aggregate accounting earnings for future GDP growth is an important question.

Aggregate accounting earnings convey information about future GDP growth because they reflect news about future macroeconomic outcomes such as domestic investments, employment, and consumption, which impact the domestic economy's output (Abdalla and Carabias 2022; Hann et al. 2021). The accounting earnings of large companies are especially informative (Gabaix 2011; Konchitchki and Patatoukas 2014b). Many large companies are MNCs, and their earnings are derived from domestic and foreign operations. The informativeness of aggregate domestic and foreign earnings growth with future GDP growth likely differ, and such a difference is an underlying assumption in prior studies (e.g., Khan et al. 2020). Therefore, as a first step, I decompose aggregate accounting earnings into aggregate domestic and foreign earnings, and I document that U.S. companies' aggregate domestic and foreign earnings growth have different associations with future U.S. GDP growth.

Tax-motivated income shifting could affect the information content of aggregate domestic and foreign earnings growth with respect to future GDP growth. An MNC can shift

[2] For example, Congress uses GDP growth forecasts to prepare the U.S. Federal budget, and the research staff of the Board of Governors of the Federal Reserve uses GDP growth forecasts to prepare the "Greenbook" before the Federal Open Market Committee's meetings, which is used to determine monetary policies.
[3] Examples of studies include Konchitchki and Patatoukas (2014a, 2014b); Ball et al. (2019); Gaertner et al. (2020); and Abdalla and Carabias (2022).

income by changing where income is reported without changing economic activities, which I refer to as "paper shifting." For example, Caterpillar shifted eighty-five percent of its parts profits to Switzerland while keeping its core parts functions in the U.S. (Douglas 2014). Paper shifting distorts the relation between reported domestic and foreign accounting earnings and economic activities. Because GDP measures the value of final goods and services produced in a country, the location of economic activities matters for purposes of forecasting future GDP growth. Therefore, I predict paper shifting reduces the informativeness of aggregate domestic and foreign earnings growth for future GDP growth.

To test my research question, I develop a novel method to empirically examine paper shifting. I adapt the empirical model in Collins et al. (1998) and Klassen and Laplante (2012a), which reflects both paper shifting and real shifting and has been used extensively in prior studies (e.g., McGuire et al. 2018; De Simone et al. 2020; Deng 2020; Drake et al. 2022). I provide evidence of paper shifting by examining the association between foreign return on fixed assets and the tax incentive to shift income. The intuition is that an MNC likely engages in more paper shifting when its foreign return on fixed assets is more sensitive to the tax incentive to shift income. Consistent with expectations, my paper shifting measure exhibits an upward trend from 1993 to 2016. Furthermore, I find stronger evidence of paper shifting when a firm has a greater opportunity or ability to engage in paper shifting.

I use this paper shifting measure to examine whether paper shifting reduces the informativeness of aggregate domestic and foreign earnings growth for future GDP growth. To test the baseline association of aggregate domestic and foreign earnings growth with future GDP growth, I use a "shock-to-shock" analysis by transforming all variables into serially uncorrelated shocks to address the concern that the persistence of aggregate earnings growth and GDP growth

could lead to spurious regression results (Abdalla and Carabias 2022; Hann et al. 2021). I regress the shock to future quarterly U.S. GDP growth on the shocks to quarterly aggregate domestic and foreign earnings growth. To examine the effect of paper shifting on these associations, I incorporate my paper shifting measure into the model and interact it with aggregate domestic and foreign earnings growth. Consistent with my prediction, I find paper shifting attenuates the association of future U.S. GDP growth with both aggregate domestic earnings growth and aggregate foreign earnings growth. The adjusted R-squared increases from 5.8% to 10.9% after incorporating paper shifting into the model, suggesting that GDP growth forecasts can be improved by considering the effect of paper shifting on the informativeness of aggregate domestic and foreign earnings growth.

I then explore potential mechanisms through which paper shifting diminishes the informativeness of aggregate domestic and foreign earnings growth for forecasting future GDP growth. Aggregate accounting earnings convey information for future GDP growth because they reflect news about future macroeconomic outcomes such as domestic investments, employment, and consumption, which impact the domestic economy's output (Abdalla and Carabias 2022; Hann et al. 2021). I find paper shifting impairs the ability of aggregate domestic earnings growth to predict future growth in domestic business investment, employment, and personal consumption, which contribute to future GDP growth. I also find paper shifting weakens the ability of aggregate foreign earnings growth to predict future personal consumption growth. These results shed light on mechanisms through which paper shifting reduces the informativeness of aggregate domestic and foreign earnings growth for predicting future GDP growth.

Next, I examine whether professional macroeconomic forecasters fully incorporate the

information content of aggregate domestic and foreign earnings growth into their GDP growth forecasts and whether paper shifting impacts professional forecasters' use of this information. I find some evidence aggregate domestic and foreign earnings growth provide information for future U.S. GDP growth incremental to GDP growth forecasts, indicating that on average professional forecasters do not fully incorporate the information in aggregate domestic and foreign earnings growth into their forecasts. When I incorporate paper shifting, I find as paper shifting increases, aggregate domestic and foreign earnings growth contain less information for future U.S. GDP growth incremental to GDP growth forecasts. These findings indicate as paper shifting increases, the information in aggregate domestic and foreign earnings growth that professional forecasters incorporate gets closer to the information that should be incorporated. These results suggest that professional forecasters do not alter their use of aggregate earnings information due to increased paper shifting, even though paper shifting reduces the information content of aggregate domestic and foreign earnings growth with respect to future U.S. GDP growth.

This study makes several contributions. First, it contributes to tax-motivated income shifting research. I develop a novel method to identify paper shifting. Existing income shifting models do not distinguish between paper shifting and real shifting. However, paper shifting substantially differs from real shifting because paper shifting harms a government's rights to tax income generated by economic activities in a jurisdiction, while real shifting changes economic activities in a jurisdiction. This new method may enable researchers to better examine paper shifting and increase our understanding of its determinants and consequences, which could assist policy makers in developing effective policies for tackling paper shifting.

Using this method, I find paper shifting reduces the informativeness of aggregate

domestic and foreign earnings growth for predicting future GDP growth. This finding increases our understanding of the consequences of tax-motivated income shifting. Prior studies find that tax-motivated income shifting increases the information asymmetry between managers and investors (Chen et al. 2018) , reduces MNCs' local investment efficiency (De Simone et al. 2022), and decreases domestic-only peers' investment efficiency (Nessa et al. 2022). These studies focus on the firm-level effects of tax-motivated income shifting, while my study draws attention to the implications for the macro-level information environment. My study indicates tax-motivated income shifting weakens the ability of aggregate accounting earnings to predict future GDP growth. This finding illustrates the negative impact of tax-motivated income shifting on the economy-wide information environment and has implications for policy makers considering tax transparency initiatives.

Second, this study contributes to research on the informativeness of aggregate accounting earnings for predicting macroeconomic outcomes. Prior research finds that aggregate accounting earnings convey information about future GDP growth, labor market outcomes, inflation, and monetary policies (Konchitchki and Patatoukas 2014a, 2014b; Ball et al. 2019; Gaertner et al. 2020; Abdalla and Carabias 2022; Hann et al. 2021; Nallareddy and Ogneva 2017; Kalay et al. 2018; Shivakumar 2007; Gallo et al. 2016). I advance this stream of research by providing evidence that paper shifting decreases the informativeness of aggregate domestic and foreign earnings growth for predicting future GDP growth. This finding highlights the effect of taxes, and paper shifting in particular, on the information content of aggregate accounting earnings with respect to future macroeconomic outcomes, which is missing in the aggregate accounting earnings literature. These findings also shed light on ways to improve GDP growth forecasts. Professional forecasters can improve GDP growth forecasts by separately examining the

information content of aggregate domestic and foreign earnings growth and considering the effect of paper shifting on their information content.

This paper proceeds as follows. Section 2 discusses prior literature and develops my hypotheses. Section 3 develops and validates the tax-motivated paper shifting measure. Section 4 describes my research design and sample construction. Section 5 reports results of hypotheses tests. Section 6 to Section 8 present results of additional analyses, and Section 9 concludes.

2. PRIOR LITERATURE AND HYPOTHESIS DEVELOPMENT

2.1. Aggregate Accounting Earnings and Future Macroeconomic Outcomes

2.1.1. Aggregate Accounting Earnings and Future GDP Growth

Aggregate accounting earnings play an important role in understanding asset prices and macroeconomic activities. In contrast to traditional firm-level analyses, aggregate-level analyses focus on economy-wide fundamentals rather than firm-level properties. For example, firm-level properties of earnings may not impact investors if they can diversify away unsystematic risks by holding a diversified portfolio (Ball and Sadka 2015). Given the importance of aggregate accounting earnings, a large body of research examines its information content for future macroeconomic outcomes, including future GDP growth.

GDP measures the value of final goods and services produced in a country.[4] Konchitchki and Patatoukas (2014a) predict and find that aggregate accounting earnings growth is a leading indicator of future GDP growth. They conjecture this is because aggregate accounting earnings proxy for corporate profits, which are a component of GDP under the income approach, and likely correlate with other GDP components. In a related study, Konchitchki and Patatoukas (2014b) apply financial statement analysis of firm profitability drivers on the aggregate level. These profitability drivers can provide timely macroeconomic information because financial statements reflect changes in economic activities at the firm-level.[5] This study finds the aggregate accounting profitability drivers, specifically asset turnover and profit margins, have predictive content for future GDP growth. Moreover, both studies find that professional

[4] U.S. GDP is measured using three approaches: the expenditures approach, income approach, and value-added approach. Under the expenditures approach, GDP is the sum of personal consumption, investment, government spending, and net exports. Under the income approach, GDP equals the sum of corporate profits, compensation, rental income, taxes on production and imports, and interest income. Under the value-added approach, GDP equals gross output minus intermediate inputs (NIPA Handbook 2020).

[5] The financial statement analysis of accounting profitability drivers is commonly called DuPont profitability analysis. It decomposes rate of return on net operating assets into asset turnover and profit margin.

forecasters do not fully incorporate the information in aggregate accounting earnings and aggregate accounting profitability drivers when they forecast future GDP growth.

After documenting aggregate accounting earnings convey information for future GDP growth, research further examines how they convey this information and provides evidence of the "corporate profit channel" and the "news channel" (Konchitchki and Patatoukas 2014a, 2014b; Gaertner et al. 2020; Hann et al. 2021; Abdalla and Carabias 2022). Under the corporate profit channel, aggregate domestic earnings reflect domestic corporate profits. Corporate profit is a component of GDP under the income approach, so aggregate domestic earnings growth affects contemporaneous GDP growth mechanically. Because contemporaneous GDP growth and future GDP growth are serially correlated, aggregate domestic earnings growth is also associated with future GDP growth (Konchitchki and Patatoukas 2014a, 2014b; Gaertner et al. 2020; Abdalla and Carabias 2022). Under the news channel, aggregate accounting earnings reflect news about future macroeconomic outcomes, such as domestic investment, employment, and consumption. For example, Hann et al. (2021) find shocks to aggregate accountings earnings reflect news about hiring and layoffs. Abdalla and Carabias (2022) argue aggregate special items reflect bad news, and they provide evidence that shocks to aggregate special items predict future investment, disposable income, unemployment, and consumption. All these macroeconomic outcomes impact future GDP growth. Therefore, aggregate accounting earnings could convey information for future GDP growth by reflecting news about the domestic economy's output.[6]

The accounting earnings of large companies are critical in conveying information for future GDP growth, because they play prominent roles in the economy (Gabaix 2011; Konchitchki and Patatoukas 2014b). Many large companies are MNCs whose earnings include

[6] My "shock-to-shock" research design removes the corporate profit channel by removing the serial correlation among variables, so I focus on the news channel in this study.

domestic and foreign components. Prior studies have not separately examined the information content of aggregate domestic and foreign earnings for future GDP growth. However, the notion that these two components convey different information for future GDP growth is intuitive and implicitly assumed by prior studies. For example, Khan et al. (2020) investigate whether taxes contribute to the disconnect between corporate performance and future economic growth. They find the growth of domestic corporate profits has outpaced future GDP growth, and this disconnect increases with the difference between the U.S. tax rate and the average tax rate of other OECD countries.

The assumption underlying Khan et al. (2020) that the associations of aggregate domestic and foreign earnings growth with future GDP growth are different has implications for this study. Aggregate domestic earnings growth is expected to be positively associated with future GDP growth, because it reflects news about future macroeconomic outcomes such as domestic investments, consumption, and hiring, which ultimately affect the domestic economy's output (Gaertner et al. 2020; Hann et al. 2021; Abdalla and Carabias 2022). In comparison, aggregate foreign earnings growth does not directly reflect news about the domestic economy, so it is unclear whether and how aggregate foreign earnings growth is associated with future domestic GDP growth. Therefore, similar to Khan et al. (2020), I expect aggregate domestic and foreign earnings growth to have different associations with future GDP growth.

2.1.2. Aggregate Accounting Earnings and Other Future Macroeconomic Outcomes

In addition to GDP growth, aggregate accounting information is predictive of other future macroeconomic outcomes, such as labor market outcomes, inflation, and monetary policies. Hann et al. (2021) examines whether aggregate earnings contain information for the labor market. They decompose aggregate earnings into aggregate core earnings and aggregate special

items. They provide evidence that shocks to aggregate core earnings predict aggregate job creation up to four quarters ahead, consistent with changes to the persistent component of earnings enabling firms to overcome the non-trivial fixed adjustment costs of hiring. They also find that shocks to aggregate special items predict aggregate job destruction up to one quarter ahead, consistent with special items reflecting forthcoming downsizing and layoffs. Nallareddy and Ogneva (2017) and Kalay et al. (2018) examine the association between earnings growth dispersion and unemployment. They predict that as earnings growth dispersion increases, frictions that inhibit immediate movement from bad-performing to good-performing firms lead to higher unemployment. Nallareddy and Ogneva (2017) find that earnings growth dispersion is positively associated with unemployment rate changes. Kalay et al. (2018) provide evidence that earnings growth dispersion strengthens the effect of poor aggregate performance on unemployment. Rouxelin et al. (2018) introduce a cost accounting topic, cost stickiness,[7] into the aggregate earnings literature and find that higher aggregate cost stickiness predicts lower future unemployment rates, consistent with firms reducing resources less in response to sales declines during high cost-stickiness periods, which contributes to lower future unemployment rates.

Regarding inflation, Shivakumar (2007) shows that aggregate earnings growth is positively associated with future inflation. Shivakumar and Urcan (2017) further explain this positive association. Aggregate earnings growth stimulates corporate investments, but the supply of investment goods and services is inelastic in the short-term. Therefore, the prices of investment goods and services increase. Consistent with this explanation, Shivakumar and Urcan (2017) provide evidence that aggregate earnings growth predicts future investment and Producer

[7] Cost stickiness is characterized by a larger increase in costs when a firm's activity rises than a decrease in costs when its activity falls by an equivalent amount (Anderson et al. 2003).

Price Index (PPI) changes.

Because aggregate earnings growth relates to future GDP growth and inflation, Gallo et al. (2016) show that positive (negative) aggregate earnings news predicts increases (decreases) in target interest rates. In summary, aggregate accounting earnings are informative of future macroeconomic outcomes, including GDP growth, labor market conditions, inflation, and monetary policies.

2.2. Tax-motivated Income Shifting

MNCs can shift income for tax purposes through accounting and finance decisions ("paper shifting") or real decisions ("real shifting") (Slemrod 1992). Paper shifting can be accomplished in several ways. First, MNCs can shift income by manipulating transfer prices for goods and services in intercompany transactions. Such transfer prices are required to be determined using the arm's length principle, but firms are often able to report lower (higher) income (expense) in high-tax jurisdictions.[8] Clausing (2003) provides evidence that U.S. MNCs change transfer prices in intrafirm transactions in response to different country tax rates, consistent with tax-motivated income shifting using transfer prices. De Simone (2016) finds that adopting International Financial Reporting Standards enables MNCs to engage in more paper shifting because MNCs can choose more tax-advantaged transfer prices from additional qualifying benchmark firms.

Second, MNCs can shift income through intercompany loans. When a subsidiary in a low-tax jurisdiction lends to a subsidiary in a high-tax jurisdiction, the interest income is taxed at a lower rate and the interest expense is deducted at a higher rate. Dharmapala and Riedel (2013)

[8] Under the arm's length principle, firms should set transfer prices between related parties as if the parties are unrelated.

provide evidence MNCs shift income by strategically using loans across subsidiaries.[9]

Third, MNCs can shift income by transferring intellectual property. After an MNC transfers intellectual property, such as patents and licenses, to a low-tax jurisdiction, the revenue generated from the intellectual property is reported and taxed in the low-tax jurisdiction. This approach is widely used by high-tech MNCs. For example, Apple locates its intellectual property in Ireland, and the Irish subsidiaries license the intellectual property to other subsidiaries. The income earned from these licensing arrangements is taxed in Ireland at a relatively low tax rate (Regan 2020). De Simone et al. (2020) provide evidence consistent with U.S. MNCs shifting intellectual property away from the R&D activity that produces these assets to lower their tax expense.

Last, MNCs can shift income using cost-sharing agreements (CSAs). In CSAs, related parties share the cost of developing intangibles in proportion to their share of reasonably anticipated benefits derived from the intangibles. When a U.S. parent and its foreign subsidiary enter into a CSA, the U.S. parent (foreign subsidiary) receives income related to the intangible generated in (outside of) the U.S. In addition, the U.S. parent and the foreign subsidiary pay each other for the intangibles contributed to the CSA based on the expected value of the intangibles, which could substantially differ from the actual value (De Simone and Sansing 2019). Therefore, MNCs have opportunities to shift income by entering into CSAs.

Because paper shifting changes where income is reported without changing the location of income-producing activities, the reported income in a jurisdiction deviates from the actual

[9] In addition to intercompany loans, MNCs can shift income using other debt financing strategies. Newberry and Dhaliwal (2001) find tax incentives are associated with where U.S. MNCs locate their interest deductions. Huizinga et al. (2008) find a foreign subsidiary's capital structure reflects local corporate tax rates and the difference between local and foreign tax rates.

value of goods and services produced in the jurisdiction.[10] Research has examined the determinants of tax-motivated income shifting (Klassen and Laplante 2012a, 2012b; De Simone 2016; Markle 2016; Dyreng and Markle 2016; McGuire et al. 2018; Deng 2020; Drake et al. 2022), but fewer studies have investigated its consequences beyond lost tax revenue.[11] Chen et al. (2018) examine whether tax-motivated income shifting increases information asymmetry between managers and investors. Because investors value domestic and foreign earnings differently and paper shifting obscures the true source of domestic and foreign earnings, paper shifting potentially increases the information asymmetry between managers and investors. Consistent with this argument, Chen et al. (2018) provide evidence that tax-motivated income shifting is positively associated with the adverse selection component of the bid-ask spread, insider trading profits, private information gathering, and analyst forecast dispersion. In another study, De Simone et al. (2022) investigate the effect of MNCs' income-shifting aggressiveness on their own local investment efficiency. To decrease tax authority scrutiny of paper shifting, MNCs could substantiate income reported in low-tax jurisdictions by making investments not corresponding to investment opportunities. De Simone et al. (2022) find that firms with high income-shifting aggressiveness show no responsiveness of local investments to investment opportunities, suggesting that income-shifting aggressiveness compromises investment efficiency. In addition to these firm-level effects, tax-motivated income shifting could affect the

[10] Tax-motivated income shifting can also be accomplished through real decisions. Real decisions involve locating profitable operating activities in low-tax jurisdictions. Grubert and Mutti (1991), for example, provide evidence taxes affect capital allocation in the manufacturing industry. Relatedly, Grubert and Mutti (2000) find that tax rates significantly impact location choices and capital investment. MNCs' labor investments are also impacted by tax incentives. For example, Hines and Rice (1994) examine whether U.S. MNCs shift their productive factors, specifically employment, to low-tax foreign tax havens. The results suggest that U.S. MNCs change their employment according to local tax rates. Williams (2018) finds a foreign country's tax rate is negatively associated with the likelihood U.S. MNCs offshore jobs to the country and the number of jobs offshored to the country.

[11] Examples of studies examining tax revenue losses include Clausing (2016), Bradbury et al. (2018), Jansky and Palansky (2019), Tørsløv et al. (2020), and Blouin and Robinson (2020).

macro-level information environment.

2.3. Hypothesis Development

Tax-motivated income shifting potentially has implications for the informativeness of aggregate accounting earnings for future GDP growth. Prior studies find aggregate accounting earnings convey information about future GDP growth (Konchitchki and Patatoukas 2014a, 2014b; Ball et al. 2019; Gaertner et al. 2020; Abdalla and Carabias 2022). The aggregate earnings of large companies are especially informative because large companies' behavior can shed light on overall economic activities (Gabaix 2011; Konchitchki and Patatoukas 2014b). Many large companies are MNCs whose earnings are derived from domestic and foreign sources. As discussed above, domestic and foreign earnings growths likely convey different information about future domestic GDP growth.

An MNC can shift income through accounting and finance decisions without moving economic activities. Such "paper shifting" distorts the relation between reported domestic and foreign earnings and the economic activities in and out of a country. For example, excerpts from Nike's 2015 and 2016 annual reports presented in Appendix A show that Nike's U.S. income before taxes decreased from $3,066 million in 2014 to $956 million in 2016, while Nike's foreign income before taxes increased from $478 million in 2014 to $3,667 million in 2016. If this were due to changes in Nike's real economic activities in and out of the U.S., we would expect Nike's U.S. and foreign long-lived assets to decrease and increase, respectively. However, the long-lived assets attributed to U.S. operations moderately increased from $1,652 million in 2014 to $2,241 in 2016 and its foreign long-lived assets (in Belgium, China, and Japan) slightly increased from $667 million in 2014 to $811 million in 2016.[12] Based on the

[12] Nike's long-lived assets primarily consist of Nike's headquarters and distributions facilities in the U.S. and distribution facilities in Belgium, China, and Japan.

comparison between earnings and long-lived assets, the significant decline in U.S. income and the dramatic change in the U.S. and foreign income split are likely not due to changes in operations but due to paper shifting income from the U.S. to foreign jurisdictions.

As shown in this example, paper shifting creates noise in reported domestic and foreign earnings growth relative to where economic activities take place, which matters for forecasting GDP growth because GDP captures the output of the domestic economy. Thus, paper shifting could reduce the informativeness of aggregate domestic and foreign earnings growth for predicting future domestic GDP growth. Therefore, I hypothesize:

H1a*: Tax-motivated paper shifting attenuates the association between aggregate domestic earnings growth and future domestic GDP growth.*

H1b*: Tax-motivated paper shifting attenuates the association between aggregate foreign earnings growth and future domestic GDP growth.*

It is possible paper shifting does not affect the informativeness of aggregate domestic and foreign earnings growth. If firm-level outbound and inbound shifting offset each other in the aggregation process, the noise in aggregate domestic and foreign earnings growth will be mitigated. As a result, the noise introduced by paper shifting may not be large enough to reduce the informativeness of aggregate domestic and foreign earnings growth for future domestic GDP growth.

3. TAX-MOTIVATED PAPER SHIFTING MEASURE

3.1. Identifying Tax-motivated Paper Shifting

To examine H1a and H1b, I develop a method to identify paper shifting by adapting the tax-motivated income shifting model in Collins et al. (1998) and Klassen and Laplante (2012a). This model has been widely used by prior studies to examine tax-motivated income shifting (e.g., Klassen and Laplante 2012b; McGuire et al. 2018; De Simone et al. 2020; Deng 2020; Drake et al. 2022). The existing model is:

$$FRoS_{i,t} = \alpha_0 + \alpha_1 RoS_{i,t} + \alpha_2 FTR\_AVE_{i,t} + Industry\ FE + +Year\ FE + \varepsilon_{i,t} \quad (1)$$

$FRoS_{i,t}$ and $RoS_{i,t}$ are firm-year foreign and worldwide pretax return on sales, respectively. $FTR\_AVE_{i,t}$ is the difference between the average U.S. statutory corporate tax rate and the average foreign effective tax rate over the years $t-2$ to t.[13] Positive (negative) $FTR\_AVE_{i,t}$ indicates an incentive to shift income out of (into) the U.S. in year t. Appendix B provides detailed variable definitions.

Figure 1.1 presents the mean value of $FTR\_AVE_{i,t}$ from 1988 to 2021. The mean value of $FTR\_AVE_{i,t}$ increases over time and changes from a negative value to a positive value around 2004. It drops after 2017, because the Tax Cuts and Jobs Act of 2017 (TCJA) lowered the top U.S. statutory tax rate from thirty-five percent to twenty-one percent. Figure 1.2 presents the percentages of U.S. MNCs with outbound ($FTR\_AVE_{i,t} > 0$) and inbound ($FTR\_AVE_{i,t} < 0$) income shifting incentives over the sample period. I observe an upward (downward) trend in the percentage of U.S. MNCs with outbound (inbound) income shifting incentives before 2017. Since 2017, the percentage of U.S. MNCs with outbound (inbound) income shifting incentives

[13] The average foreign tax rate is the ratio of the cumulative foreign tax expense from year $t-2$ to year t to the cumulative pretax foreign income from year $t-2$ to year t.

decreases (increases). The pre-TCJA trends in Figure 1.1 are consistent with the findings in Klassen and Laplante (2012a) and Chen et al. (2018). In Equation (1), a positive coefficient on $FTR\_AVE_{i,t}$ ($\alpha_2 > 0$) is interpreted as evidence of tax-motivated income shifting because it indicates an association between an incentive to shift income out of (into) the U.S and a higher (lower) foreign return on sales.[14]

In this model, the association between the tax incentive and the portion of foreign return on sales that is not explained by worldwide return on sales, which I refer to as unexplained foreign return on sales, can be caused by paper shifting because paper shifting changes the income reported in foreign jurisdictions without impacting sales to external customers. However, the association can also be due to real shifting if U.S. MNCs with low average foreign tax rates strategically locate high-margin activities abroad (Collins et al. 1998).

To identify paper shifting, I replace foreign (worldwide) return on sales in Equation (1) with foreign (worldwide) return on fixed assets:

$$FRoFA_{i,t} = \alpha_0 + \alpha_1 RoFA_{i,t} + \alpha_2 FTR\_AVE_{i,t} + Industry\ FE + Year\ FE + \varepsilon_{i,t} \quad (2)$$

$FRoFA_{i,t}$ and $RoFA_{i,t}$ are firm-year foreign and worldwide pretax return on fixed assets, respectively.[15] A positive coefficient on $FTR\_AVE_{i,t}$ ($\alpha_2 > 0$) indicates an association between an incentive to shift income out of (into) the U.S. and a higher (lower) foreign pretax return on fixed assets, which is interpreted as evidence of paper shifting.

I use public disclosure of geographic assets to construct foreign return on fixed assets. Public U.S. entities are required to disclose information about long-lived assets by geographic

[14] One potential weakness of this model is that the pretax rate of return on sales could correlate with tax incentives, so a higher foreign pretax return on sales could be driven more by the economics of foreign markets and less by tax-motivated income shifting.

[15] I do not include intangible assets in the calculation of return on fixed assets because a common paper shifting technique is to move intangible assets and related profits to low-tax jurisdictions. The allocation of fixed assets is less impacted by paper shifting.

area in segment reporting unless it is impracticable to do so (FASB, ASC 280).[16] Based on an (untabulated) analysis of Compustat firms, approximately 65% of MNCs disclosed geographic assets from 1988 to 2021. The disclosure of U.S. and foreign assets is inconsistent across firms. Some firms disclose U.S. and foreign long-lived assets, while others disclose U.S. and foreign property, plant, and equipment (PPE) or general assets. I use foreign PPE as the primary measure of foreign fixed assets because PPE better proxy for fixed assets than long-lived assets and general assets. For firms that do not disclose foreign PPE but disclose foreign long-lived assets or general assets, I use the ratio of foreign to total long-lived assets or general assets to allocate consolidated PPE to U.S. and foreign fixed assets. Appendix C provides examples of geographic assets disclosures and detailed imputation steps.

I expect my empirical model using return on fixed assets (Equation (2)) to better capture paper shifting than the model using return on sales (Equation (1)) for several reasons. First, as Collins et al. (1998) explain, the association between the tax incentive to shift income and the unexplained foreign return on sales could be due to real shifting if U.S. MNCs with low average foreign tax rates are more likely to locate high-margin activities abroad and low-margin activities domestically. In contrast, the association between the tax incentive and the unexplained foreign return on fixed assets (i.e., the portion of foreign return on fixed assets that is not explained by worldwide return on fixed assets) is more likely caused by paper shifting than real shifting, because if an MNC moves economic activities (i.e., real shifting) both foreign income and foreign fixed assets will change. Thus, foreign return on fixed assets will not change much

[16] ASC 280 requires public entities to disclose certain information about segments to assist financial statement users in evaluating their performance and prospects. Prior to December 15, 1997, SFAS 14 required disclosure of revenue, earnings, and assets by industry and geographic segments. Since SFAS 131 became effective on December 15, 1997, public entities are only required to disclose revenue, earnings, and assets for operating segments, which are determined by how management internally evaluates performance and allocates resources. For product or service lines and geographic areas, public entities only need to disclose revenue and assets.

compared to moving income on paper (i.e., paper shifting).

Second, a model using return on fixed assets is more consistent with how prior studies define paper shifting. For example, Klassen and Laplante (2012a) define paper shifting, the non-arm's length component of intercompany transactions, as "a plan or structure that causes relatively more income to be earned in lower tax rate jurisdictions than would otherwise be expected based on the company's worldwide asset allocation" (p. 1246). Therefore, my model improves on the existing model by replacing return on sales with return on fixed assets, which is a better metric to identify paper shifting.

Third, my approach to identifying paper shifting aligns with how regulators view paper shifting. To prevent U.S. tax base erosion, in 2018 U.S. tax law began to impose a tax on foreign income assumed to be derived from mobile intangible assets, known as Global Intangible Low-Taxed Income (GILTI), to discourage U.S. MNCs from shifting profits on intangible assets to low-tax jurisdictions. To estimate GILTI, an MNC uses a controlled foreign corporation's (CFC's) fixed assets to calculate the deemed tangible income return, and the CFC's total income above this deemed amount is presumed to be GILTI. In essence, the U.S. government views CFCs' profits that are high relative to their investment in fixed assets as income shifted using intangible assets, which is similar to my approach to identifying paper shifting. Similarly, the OECD defines paper shifting as the movement of taxable profits away from the economic activities generating those profits. Fixed assets and labor are usually viewed as the determinants of economic activities (OECD 2015). Consistent with this, the Country-by-Country Reporting requirements implemented by countries around the world require MNCs to disclose country-level pretax profits, tangible assets, and the number of employees to tax authorities. Tax authorities use these economic indicators to evaluate whether profits deviate from economic

activities. Therefore, my approach to identifying paper shifting aligns with the U.S. and OECD regulators' approaches to assessing paper shifting risk.

3.2. Validation of Paper Shifting Model

3.2.1. Time Trend of Paper Shifting

I validate this model by examining the trend in paper shifting over time. I expect an upward trend in paper shifting because Klassen and Laplante (2012a) and Chen et al. (2018) find that tax-motivated income shifting increases over time. I construct an annual paper shifting measure by estimating the following equation for each year:

$$FRoFA_{i,t} = \alpha_0 + \alpha_1 RoFA_{i,t} + \alpha_2 FTR\_AVE_{i,t} + Industry\ FE + \varepsilon_{i,t} \quad (3)$$

Positive values of α_2 indicate higher (lower) values of $FTR\_AVE_{i,t}$, which increases (decreases) with an MNC's incentive to shift income out of (into) the U.S., are associated with higher (lower) foreign return on fixed assets, after controlling for worldwide return on fixed assets and industry fixed effects. Thus, a positive α_2 captures tax-motivated paper shifting for the year, and a higher value of α_2 indicates greater paper shifting. The annual paper shifting measure, $Shift_t$, equals α_2 if α_2 is positive; otherwise $Shift_t$ equals zero. Table 1.1 summarizes the sample construction process for the validation tests. Table 1.2 provides descriptive statistics for the variables used in the validation tests.

Figure 2.1 presents U.S. MNCs' paper shifting by year. I observe an upward trend in paper shifting during the sample period, consistent with the findings in Klassen and Laplante (2012a) and Chen et al. (2018). I then compare the time trend of annual paper shifting to the time trend of general tax-motivated income shifting captured by the model in Collins et al. (1998) and Klassen and Laplante (2012a). I construct an annual general tax-motivated income shifting measure by replacing foreign (worldwide) return on fixed assets in Equation (3) with foreign

(worldwide) return on sales. Figure 2.2 presents U.S. MNCs' general tax-motivated income shifting by year. Unlike Figure 2.1, annual general tax-motivated income shifting does not exhibit a clear upward trend during this sample period.[17] Therefore, the annual paper shifting measure constructed using my model is consistent with the expectation that tax-motivated paper shifting has increased over time.

3.2.2. Cross-sectional Variation in the Strength of Paper Shifting

I further validate this model by examining cross-sectional variation in the strength of paper shifting evidence. I expect paper shifting evidence, proxied by the association between the tax incentives to shift income and foreign return on fixed assets, will be stronger when an MNC has greater opportunities or ability to engage in paper shifting. I use three proxies for paper shifting opportunities or ability ($Ability_{i,t}$): (1) intangible intensity ($IntanIn_{i,t}$), (2) tax haven use intensity ($HavenIn_{i,t}$), and (3) membership in the High-Tech industry ($HighTech_{i,t}$). First, firms with greater intangible intensity incur lower costs to shift income by transferring intangible assets because it is harder for tax authorities to monitor transfer prices given the lack of comparable prices from arm's length transactions (Harris 1993; Harris et al. 1993; Klassen and Laplante 2012a). Second, establishing foreign subsidiaries in tax haven countries is a common strategy for paper shifting, so firms with greater tax haven intensity can better shift income (Hines and Rice 1994; Dyreng and Lindsey 2009). Third, firms in the High-Tech industry have a greater ability to shift income on paper because they have more intangible assets than firms in other industries (De Simone, Mills, and Stomberg 2019).

I estimate the following equation to examine the cross-sectional variation in paper shifting based on intangible intensity, tax haven use intensity, and membership in the High-Tech

[17] Annual general tax-motivated income shifting exhibits an upward trend from 1988 to 2009, which is consistent with the findings in Klassen and Laplante (2012a).

industry:

$$FRoFA_{i,t} = \alpha_0 + \alpha_1 RoFA_{i,t} + \alpha_2 FTR\_AVE_{i,t} + \alpha_3 Ability_{i,t} + \alpha_4 FTR\_AVE_{i,t} \times Ability_{i,t} + Industry\ FE + Year\ FE + \varepsilon_{i,t} \quad (4)$$

A positive coefficient on the interaction term $FTR\_AVE_{i,t} \times Ability_{i,t}$ is consistent with firms with a greater ability to shift income engaging in more paper shifting.

I present the results in Table 2.1, Columns (1), (3), and (5). I observe positive and significant coefficients on $FTR\_AVE_{i,t}$, indicating that U.S. MNCs engage in paper shifting. Consistent with my expectations, I find positive and significant coefficients on $FTR\_AVE_{i,t} \times Ability_{i,t}$, which indicates that U.S. MNCs shift more income on paper when they have a greater ability to do so. These results are consistent with this model capturing paper shifting.

I compare my paper shifting model to the general tax-motivated income shifting model developed by Collins et al. (1998) and extended by Klassen and Laplante (2012a). While I expect the general tax-motivated income shifting model to present stronger evidence of overall income shifting when a firm has a greater ability to shift income on paper because paper shifting contributes to overall income shifting, I expect the relative magnitude of the coefficient on $FTR\_AVE_{i,t} \times Ability_{i,t}$ (α_4 / α_2) in my model will be larger than in the general tax-motivated income shifting model. Because my model reflects the incremental paper shifting relative to baseline paper shifting, while the general tax-motivated income shifting model reflects the incremental paper shifting relative to baseline general tax-motivated income shifting.

I present the results using the general tax-motivated income shifting model in Table 2.1 Columns (2), (4), and (6). Consistent with expectations, I find positive and significant coefficients on $FTR\_AVE_{i,t}$ and $FTR\_AVE_{i,t} \times Ability_{i,t}$. Comparing the relative magnitudes of the coefficients on $FTR\_AVE_{i,t} \times Ability_{i,t}$ in the two models, the one in my model using

foreign return on fixed assets are larger. For example, the relative magnitude of the coefficient in Column (1) of 2.479 is larger than the relative magnitude in Column (2) of 0.627. Thus, my model presents stronger evidence of paper shifting when U.S. MNCs have a greater ability to shift income on paper.

3.3. Quarterly Paper Shifting Measure

Having developed and validated the tax-motivated paper shifting model, I use it to examine whether tax-motivated paper shifting reduces the informativeness of aggregate domestic and foreign earnings growth for predicting future GDP growth. Because GDP growth is measured quarterly, I construct a quarterly aggregate paper shifting measure by estimating the following equation for each quarter using firm-quarter observations:

$$FRoFA_{i,q} = \alpha_0 + \alpha_1 RoFA_{i,q} + \alpha_2 FTR\_AVE_{i,q} + Industry\ FE + \varepsilon_{i,q} \quad (5)$$

Because foreign income, foreign fixed assets, and foreign tax expense are disclosed in annual financial statements, I estimate quarterly foreign income, foreign fixed assets, and FTR_AVE using available annual information (i.e., using the most recent annual information to impute amounts for the current year Q1-Q3).[18] In Equation (5), α_2 captures tax-motivated paper shifting for quarter q. $Shift_q$ equals α_2 if α_2 is positive and zero otherwise. To mitigate the impact of the noise in $Shift_q$ on my empirical tests, I transform $Shift_q$ to $Shift\_rank_q$, a scaled rank variable ranging from zero to one, by dividing $Shift_q$ into quintiles. Figure 3.1 presents U.S. MNCs' quarterly paper shifting over time. I observe an upward trend in quarterly paper shifting during my sample period.

[18] Quarterly pretax foreign income equals quarterly pretax income multiplied by the ratio of annual pretax foreign income to annual pretax income. Quarterly foreign fixed assets equal quarterly fixed assets multiplied by the ratio of annual foreign fixed assets to annual fixed assets. The quarterly foreign tax rate differential equals the annual foreign tax rate differential.

4. RESEARCH DESIGN AND SAMPLE CONSTRUCTION

4.1. Research Design

4.1.1. Informativeness of Aggregate Domestic and Foreign Earnings Growth

Before testing my hypotheses, I decompose aggregate accounting earnings growth into aggregate domestic and foreign earnings growth and document empirically whether these two components are differently associated with future U.S. GDP growth. Because GDP growth and aggregate earnings growth are persistent, the significant autocorrelation can lead to spurious regression results. Therefore, following Abdalla and Carabias (2022), I use a "shock-to-shock" analysis by transforming all variables to serially uncorrelated shocks using autoregressive models of different orders. For example, the shocks to GDP growth, aggregate domestic earnings growth, and aggregate foreign earnings growth are residuals from the following AR(1) models, respectively:[19]

$$\text{AR(1): } g\_final_{q+1} = \beta_0 + \beta_1 g\_final_q + \varepsilon_q$$

$$\Delta earn\_dom_q = \beta_0 + \beta_1 \Delta earn\_dom_{q-1} + \varepsilon_q$$

$$\Delta earn\_for_q = \beta_0 + \beta_1 \Delta earn\_for_{q-1} + \varepsilon_q$$

g_final_{q+1} is the final estimate of real GDP growth for quarter $q+1$.[20] $\Delta earn\_dom_q$ and $\Delta earn\_for_q$ are the aggregate growth in scaled pretax domestic and foreign earnings. For each firm i in quarter q, I measure domestic and foreign earnings ($earn\_dom_{i,q}$ and $earn\_for_{i,q}$) as estimated quarterly pretax domestic and foreign income scaled by worldwide sales or market

[19] I also generate shocks using the following AR(2) models:
$g\_final_{q+1} = \beta_0 + \beta_1 g\_final_q + \beta_2 g\_final_{q-1} + \varepsilon_q$
$\Delta earn\_dom_q = \beta_0 + \beta_1 \Delta earn\_dom_{q-1} + \beta_2 \Delta earn\_dom_{q-2} + \varepsilon_q$
$\Delta earn\_for_q = \beta_0 + \beta_1 \Delta earn\_for_{q-1} + \beta_2 \Delta earn\_for_{q-2} + \varepsilon_q$

[20] The final estimates of real GDP growth are the third estimates of real GDP growth and are released at the end of the third month following the quarter end. They incorporate more accurate information than the advance and second estimates of real GDP growth, which are released at the end of the first and second month, respectively, following the quarter end.

value of equity (Konchitchki and Patatoukas 2014a; Abdalla and Carabias 2022). Because pretax domestic and foreign income are disclosed annually, I estimate quarterly pretax domestic and foreign income using available annual information (i.e., use the most recent annual information to impute amounts for the current year Q1-Q3).[21] I measure growth in domestic and foreign earnings ($\Delta earn\_dom_{i,q}$ and $\Delta earn\_for_{i,q}$) as the year-over-year change in scaled domestic and foreign earnings following prior literature (Konchitchki and Patatoukas 2014a; Gaertner et al. 2020; Abdalla and Carabias 2022). I construct $\Delta earn\_dom_q$ and $\Delta earn\_for_q$ using the value-weighted cross-sectional average of $\Delta earn\_dom_{i.q}$ and $\Delta earn\_for_{i,q}$ with weights based on firms' market capitalization as of the beginning of each quarter.

I estimate the following equation to examine the associations of aggregate domestic and foreign earnings growth with future U.S. GDP growth:

$$res\_g\_final_{q+1} = \alpha + \beta_1 res\_\Delta earn\_dom_q + \beta_2 res\_\Delta earn\_for_q + \gamma_1 res\_g\_adv_q + \gamma_2 res\_inf_q + \varepsilon_{q+1} \quad (6)$$

The dependent variable is the shock to the final estimate of real GDP growth for quarter *q+1*. $res\_\Delta earn\_dom_q$ ($res\_\Delta earn\_for_q$) is the shock to the aggregate growth in pretax domestic (foreign) earnings. Following prior studies (Konchitchki and Patatoukas 2014a; Abdalla and Carabias 2022), I control for the shock to the advance release of real GDP growth ($res\_g\_adv_q$) and inflation growth (res_inf_q) for quarter q.[22] I predict a positive coefficient on $res\_\Delta earn\_dom_q$ ($\beta_1 > 0$), indicating that aggregate domestic earnings growth is positively associated with future U.S. GDP growth. I make no prediction for the sign and the significance

[21] Quarterly pretax domestic (foreign) income equals quarterly pretax income multiplied by the ratio of annual pretax domestic (foreign) income to annual pretax income.
[22] The advance estimates of real GDP growth are the first estimates of real GDP growth. They are released at the end of the first month following the quarter end.

of the coefficient on $res\_\Delta earn\_for_q$ (β_2). A positive (negative) coefficient indicates that aggregate foreign earnings growth is positively (negatively) associated with future U.S. GDP growth. I expect β_1 to differ from β_2.

4.1.2. Effect of Paper Shifting on the Informativeness of Aggregate Domestic and Foreign Earnings Growth

To test H1a and H1b regarding whether paper shifting reduces the informativeness of aggregate domestic and foreign earnings growth for predicting future U.S. GDP growth, I estimate the following equation:

$$res\_g\_final_{q+1} = \alpha + \beta_1 Shift\_rank_q + \beta_2 res\_\Delta earn\_dom_q + \beta_3 Shift\_rank_q \times res\_\Delta earn\_dom_q + \beta_4 res\_\Delta earn\_for_q + \beta_5 Shift\_rank_q \times res\_\Delta earn\_for_q + \gamma_1 res\_g\_adv_q + \gamma_2 res\_inf_q + \varepsilon_{q+1} \quad (7)$$

H1a (H1b) predicts β_3 (β_5) will have the opposite sign of β_2 (β_4), indicating that paper shifting reduces the informativeness of aggregate domestic and foreign earnings growth for future U.S. GDP growth.

4.2. Sample Construction

I obtain accounting earnings data from Compustat. I include domestic and multinational firms in the construction of aggregate accounting earnings. I require all firm-quarter observations to have non-missing domestic earnings growth ($\Delta earn\_dom_{i,q}$), foreign earnings growth ($\Delta earn\_for_{i,q}$), market value of equity, and the quarterly earnings announcement date. Following prior studies, I remove observations in the top and bottom percentile of $earn\_dom_{i,q}$, $earn\_for_{i,q}$, $\Delta earn\_dom_{i,q}$, and $\Delta earn\_for_{i,q}$ to mitigate the impact of outliers (Konchitchki and Patatoukas 2014a; Gaertner et al. 2020). I calculate the aggregate domestic and foreign earnings growth ($\Delta earn\_dom_q$ or $\Delta earn\_for_q$) for a calendar quarter using observations whose

quarterly earnings become available within 45 days following the calendar quarter-end.[23] Table 3.1 summarizes my process to select observations to construct aggregate accounting earnings.

I obtain U.S. Bureau of Economic Analysis (BEA)'s advance and final estimates of realized real GDP growth from the Real-Time Data Set for Macroeconomists of the Federal Reserve Bank of Philadelphia. The BEA reports its advance estimates of realized real GDP growth in the National Income and Product Accounts (NIPA) at the end of the first month following the quarter end. The advance estimates are based primarily on monthly voluntary Census Bureau surveys, which collect information from business owners and other economic agents (Landefeld, Seskin, and Fraumeni 2008). Unavailable information is imputed using trend extrapolations based on available data. As more information becomes available (e.g., surveys covering the last month of the quarter), the BEA revises its estimates and reports its final estimate of realized real GDP growth at the end of the third month following the quarter end.[24] Figure 4.1 shows the timeline for the measurement of the main variables.

The sample period starts from 1988 and ends in 2021. Because U.S. GDP changed drastically in 2020 due to the outbreak of COVID-19, I remove the year 2020 from my sample period to mitigate the effect of outliers. The advance estimate of GDP growth is unavailable for the fourth quarter of 1994 because of the federal government shutdown. Therefore, the sample has data for 131 quarters from Q1:1988 to Q4:2021, except the quarters in 2020. Because I use one or two quarters in the AR(1) or AR(2) model to generate shock form variables, I have data

[23] Because professional forecasters make forecasts for future GDP growth around 45 days following the calendar quarter-end, quarterly earnings released in this time span are in their available information set. For the firms whose quarterly earnings become available after 45 days following the calendar quarter-end, I include them in the calculation of aggregate domestic and foreign earnings growth for the next quarter.

[24] The BEA revises the estimates of GDP for the most recent year and the two proceeding years in each summer using data from annual mandatory Census Bureau surveys, the Internal Revenue Service, and other available sources. Every five years, BEA makes comprehensive revisions of GDP estimates, largely based on detailed economic census data (Landefeld, Seskin, and Fraumeni 2008).

for 130 or 129 quarters to estimate my tests.

5. DESCRIPTIVE STATISTICS AND RESULTS

5.1. Descriptive Statistics and Correlations

Figure 5.1 presents the final estimates of realized real GDP growth from 1988 to 2021. The final estimates of realized real GDP growth fluctuated over the sample period and changed drastically in 2020 due to the outbreak of COVID-19. Table 4.1 presents descriptive statistics for the main variables. The average final estimate of real GDP growth (g_final_{q+1}) is 2.5%, with a standard deviation of 2.3%. Aggregate domestic and foreign earnings growth ($\Delta earn\_dom_q$ and $\Delta earn\_for_q$) have mean values of 0.001 and -0.001 and standard deviations of 0.027 and 0.005, respectively.

Table 4.2 reports correlations among the shocks to these main variables. (The paper shift variable ($Shift_q$) is not in shock form). The final estimate of real GDP growth ($res\_g\_final_{q+1}$) is positively correlated with aggregate domestic earnings growth ($res\_\Delta earn\_dom_q$), consistent with aggregate domestic earnings growth conveying positive information for future U.S. GDP growth. The correlation between the final estimate of real GDP growth and aggregate foreign earnings growth ($res\_\Delta earn\_for_q$) is insignificant.

5.2. Results of Examining the Informativeness of Aggregate Domestic and Foreign Earnings Growth

As a first step, I examine whether aggregate domestic and foreign earnings growth have different information content for future U.S. GDP growth, and Table 5.1 presents the results.[25] In Column (1), when I use sales as the earnings deflator and obtain shock form variables using

[25] Before examining the informativeness of aggregate domestic and foreign earnings growth, I examine whether aggregate accounting earnings, measured with pretax income, contain information for future GDP growth. The results are tabulated in Appendix D. I do not find evidence that aggregate pretax accounting earnings contains information for future GDP growth.

AR(1) models, the coefficient on $res\_\Delta earn\_dom_q$ is positive and significant, indicating that aggregate domestic earnings growth is positively associated with future U.S. GDP growth, which is consistent with my expectation. The coefficient on $res\_\Delta earn\_for_q$ is negative and significant. This evidence is consistent with MNCs' foreign operations and domestic operations being substitutes, and thus aggregate foreign earnings growth indicates weaker domestic economic prospects.[26] In Column (2), I obtain shock form variables using AR(2) models and obtain similar results. In Columns (3) and (4) when I use market value of equity as the earnings deflator and obtain shock form variables using AR(1) and AR(2) models, respectively, inferences are unchanged, except the coefficient on $res\_\Delta earn\_for_q$ is not significant at conventional levels using a two-tailed test (p-value= 0.16 and 0.17). Therefore, Table 5.1 documents a positive (negative) association between aggregate domestic (foreign) earnings growth and future U.S. GDP growth. Consistent with expectations, the coefficient on $res\_\Delta earn\_dom_q$ is significantly different from the coefficient on $res\_\Delta earn\_for_q$ in all columns, indicating that aggregate domestic and foreign earnings growth are different in their informativeness for future U.S. GDP growth. This is important for my study, because it is a necessary condition for paper shifting to potentially impact the informativeness of aggregate domestic and foreign earnings growth for future U.S. GDP growth.

5.3. Results of Testing H1a and H1b

Table 6.1 presents the results of testing whether paper shifting reduces the

[26] MNCs can shift economic activities, such as hiring and investments, from a home country to foreign countries (i.e., real shifting) for lower labor costs, tax savings, etc. Prior studies provide evidence that U.S. MNCs move U.S. jobs, especially manufacturing jobs, abroad to increase productivity, save costs, and reduce tax expense (e.g., Grossman and Rossi-Hansberg 2008; Williams 2018). As to investments, Khan et al. (2020) find that when the tax rate is higher in the U.S. than in other OECD countries, fewer domestic corporate profits are subsequently used to make domestic investments, suggesting that U.S. MNCs divert investments to lower-tax foreign jurisdictions to obtain higher after-tax returns. Because employment opportunities and investments flow out of the U.S. to foreign operations, higher aggregate foreign earnings growth indicates weaker domestic economic prospects.

informativeness of aggregate domestic and foreign earnings growth for future U.S. GDP growth (H1a and H1b). In Column (1), where I use sales as the earnings deflator and obtain shock form variables using AR(1) models, the coefficient on $res\_\Delta earn\_dom_q$ is positive and significant, indicating aggregate domestic earnings growth is positively associated with future U.S. GDP growth when paper shifting is low. Consistent with H1a, the coefficient on $Shift\_rank_q \times res\_\Delta earn\_dom_q$ is negative and significant, indicating that paper shifting attenuates the association between aggregate domestic earnings growth and future U.S. GDP growth. The effect of paper shifting on the informativeness of aggregate domestic earnings growth is economically significant. The combination of the two coefficients ($\beta_2 + \beta_3$) is not significantly different from zero, indicating no association between aggregate domestic earnings growth and future U.S. GDP growth when paper shifting is high.

Regarding aggregate foreign earnings growth, the coefficient on $res\_\Delta earn\_for_q$ is negative and significant in Column (1), indicating that aggregate foreign earnings growth is negatively associated with future U.S. GDP growth when paper shifting is low. The coefficient on $Shift\_rank_q \times res\_\Delta earn\_for_q$ is positive but not significant at conventional levels (two-tailed p-value=0.12).

In Column (2), I obtain shock form variables using AR(2) models, and the inferences do not change. In Columns (3) and (4), when I use the market value of equity as the earnings deflator, the coefficient on $Shift\_rank_q \times res\_\Delta earn\_for_q$ is positive and significant. These results indicate that paper shifting attenuates the association between aggregate foreign earnings growth and future U.S. GDP growth, which is consistent with H1b. The sum of the two coefficients ($\beta_4 + \beta_5$) is not significantly different from zero, indicating aggregate foreign earnings growth is not significantly associated with future U.S. GDP growth when paper shifting

is high. In summary, I find evidence consistent with H1a (H1b) that paper shifting reduces the informativeness of aggregate domestic (foreign) earnings growth for future U.S. GDP growth. In fact, when paper shifting is high, aggregate domestic and foreign earnings growth do not convey information about future U.S. GDP growth.

As an additional indicator of economic significance, the adjusted R-squared increases substantially after including paper shifting and its interaction with aggregate domestic and foreign earnings growth in the model (i.e., Table 6.1 versus Table 5.1). Specifically, the adjusted R-squared is 0.058 in Table 5.1, Column (1), and 0.109 in Table 6.1, Column (1). Thus, the adjusted R-squared almost doubles. Therefore, incorporating paper shifting into the model significantly increases its explanatory power. This implies that GDP growth forecasts can potentially be improved by incorporating the effect of paper shifting on the informativeness of aggregate domestic and foreign earnings growth.

6. BUSINESS INVESTMENT, EMPLOYMENT, AND PERSONAL CONSUMPTION

Given the findings above, I investigate potential mechanisms through which paper shifting diminishes the informativeness of aggregate domestic and foreign earnings growth for forecasting future GDP growth. Aggregate accounting earnings convey information for future GDP growth by reflecting news about business investment and hiring, personal wealth and consumption, and ultimately the domestic economy's output (Abdalla and Carabias 2022; Hann et al. 2021). Therefore, I examine whether paper shifting diminishes the informativeness of aggregate domestic and foreign earnings growth for predicting domestic business investment, employment, and personal consumption.

As a first step, I examine whether aggregate domestic and foreign earnings growth have different associations with domestic business investment, employment, and personal consumption by estimating Equation (6) with future growth in business investment, employment, and personal consumption as the dependent variable. Table 7.1 presents the results for specifications using sales as the earnings deflator and obtaining shock form variables using AR(1) models.[27] The positive and significant coefficient on $res\_\Delta earn\_dom_q$ in all columns indicates that aggregate domestic earnings growth is positively associated with future domestic business investment growth, employment growth, and personal consumption growth. The coefficient on $res\_\Delta earn\_for_q$ is negative and significant in Column (2) when future domestic employment growth is the dependent variable, indicating that aggregate foreign earnings growth is negatively associated future domestic employment growth. The coefficients on $res\_\Delta earn\_dom_q$ significantly differs from the coefficient on $res\_\Delta earn\_for_q$ when future

[27] In Appendix E, I use market value of equity as an alternative earnings deflator and use AR(1) and AR(2) models to obtain shock form variables. The results are qualitatively similar.

domestic employment growth and personal consumption growth are the dependent variable, consistent with aggregate domestic and foreign earnings growth behaving differently in conveying information for future macroeconomic outcomes.

To examine whether paper shifting weakens the informativeness of aggregate domestic and foreign earnings growth for predicting these future macroeconomic outcomes, I estimate Equation (7) with the future growth in business investment, employment, and personal consumption as the dependent variable, respectively. Table 7.2 presents the results. The positive and significant coefficient on $res\_\Delta earn\_dom_q$ in all columns indicates that when paper shifting is low, aggregate domestic earnings growth is positively associated with future domestic business investment growth, employment growth, and personal consumption growth. The negative and significant coefficient on $Shift\_rank_q \times res\_\Delta earn\_dom_q$ indicates that these positive associations become weaker as paper shifting increases. Regarding economic significance, the sum of the two coefficients ($\beta_2 + \beta_3$) is insignificant in Columns (2) and (3), indicating that aggregate domestic earnings growth loses its informativeness for these future macroeconomic outcomes when paper shifting is high.

For aggregate foreign earnings growth, the coefficient on $res\_\Delta earn\_for_q$ is negative and significant in Columns (2) and (3) when future employment growth and personal consumption growth are the dependent variable, indicating that aggregate foreign earnings growth is negatively associated with future employment growth and personal consumption growth when paper shifting is low. The coefficient on $Shift\_rank_q \times res\_\Delta earn\_for_q$ is positive and significant in Column (3) when personal consumption growth is the dependent variable, consistent with paper shifting weakening the association between aggregate foreign earnings growth and future personal consumption growth in all Columns. The sum of the two

coefficients ($\beta_4 + \beta_5$) is not statistically significant, indicating when paper shifting is high, aggregate foreign earnings growth does not have information content. In summary, these results suggest that paper shifting reduces the informativeness of aggregate domestic and foreign earnings growth for predicting future growth in domestic business investment, employment, and personal consumption. These are potential channels through which paper shifting reduces the informativeness of aggregate domestic and foreign earnings growth for predicting future GDP growth.

7. GDP GROWTH FORECASTS

In the main analyses, I find that aggregate domestic and foreign earnings growth contain different information about future U.S. GDP growth, and paper shifting reduces their informativeness. It is natural to ask (1) whether professional forecasters fully incorporate the information contained in aggregate domestic and foreign earnings growth when they forecast U.S. GDP growth and (2) whether paper shifting impacts their use of the information.

I first examine whether professional forecasters fully incorporate the information in aggregate domestic and foreign earnings growth into their forecasts of U.S. GDP growth. Prior studies find that professional forecasters do not fully incorporate the information in aggregate accounting earnings growth into their forecasts (Konchitchki and Patatoukas 2014a; Gaertner et al. 2020; Abdalla and Carabias 2022). Analyzing aggregate domestic and foreign earnings growth separately involves additional information processing costs. Therefore, I predict that professional forecasters do not fully incorporate the information in aggregate domestic and foreign earnings growth into GDP growth forecasts.

To test this prediction, I estimate the following equation following prior studies (Konchitchki and Patatoukas 2014a; Abdalla and Carabias 2022):

$$res\_g\_final_{q+1} = \alpha + \beta_1 res\_\Delta earn\_dom_q + \beta_2 res\_\Delta earn\_for_q + \gamma_1 res\_E_q(g_{q+1}) + \gamma_2 res\_g\_adv_q + \gamma_3 res\_inf_q + \varepsilon_{q+1} \quad (8)$$

where $res\_E_q(g_{q+1})$ is the shock to the mean consensus Survey of Professional Forecasters (SPF) forecast of real GDP growth for quarter $q+1$ as of quarter q. The SPF is the oldest and most well-regarded publicly available survey of macroeconomic forecasts in the U.S, so it has been widely used in prior studies (e.g., Sims 2002; Ang et al. 2007; Konchitchki and Patatoukas 2014a, 2014b; Gaertner et al. 2020; Abdalla and Carabias 2022). I obtain the mean consensus

SPF forecast of U.S. GDP growth from the Federal Reserve Bank of Philadelphia. I focus on the mean consensus SPF forecasts rather than individual panelists' forecasts because the mean consensus SPF forecasts are consistently more accurate (e.g., Zarnowitz and Braun 1993; Croushore 2011). Figure 4.1 shows the timing of SPF forecasts and the measurement of other variables.

In Equation (8), I examine whether aggregate domestic and foreign earnings growth provide information for future U.S. GDP growth incremental to U.S. GDP growth forecasts. Whether aggregate domestic and foreign earnings growth provide incremental information depends on (1) how much information aggregate domestic and foreign earnings growth contain about future U.S. GDP growth and (2) how much of this information professional forecasters incorporate. If aggregate domestic and foreign earnings growth contain information about future GDP growth (as documented by the results in Table 5.1), and professional forecasters do not (do) fully incorporate the embedded information, aggregate domestic and foreign earnings growth will (will not) provide information for future U.S. GDP growth incremental to U.S. GDP growth forecasts. I predict β_1 and β_2 will be significant, indicating that aggregate domestic and foreign earnings growth provides information for future U.S. GDP growth incremental to GDP growth forecasts, and therefore professional forecasters do not fully incorporate the information in aggregate domestic and foreign earnings growth into their GDP growth forecasts.[28]

I present the results in Table 8.1. In Column (1), I use sales as an earnings deflator and obtain shock form variables using AR(1) models. The coefficient on $res\_\Delta earn\_dom_q$ is positive but not significant at conventional levels, with a two-tailed p-value of 0.12. The

[28] It is difficult to interpret β_2 when there is no evidence showing aggregate foreign earnings growth contains information about future U.S. GDP growth. Therefore, I only predict β_2 will be significant if aggregate foreign earnings growth conveys information for future U.S. GDP growth when paper shifting is not considered (as shown in Table 5.1, Columns (1) and (2)).

coefficient on $res\_\Delta earn\_for_q$ is negative and significant, indicating that professional forecasters do not fully incorporate the information in aggregate foreign earnings growth into U.S. GDP growth forecasts. In Column (2), I obtain shock form variables using AR(2) models, and the coefficient on $res\_\Delta earn\_dom_q$ is positive and significant, indicating that professional forecasters do not fully incorporate the information in aggregate domestic earnings growth into U.S. GDP growth forecasts. Similar to Column (1), the coefficient on $res\_\Delta earn\_for_q$ is negative and significant. In Columns (3) and (4), I use market value of equity as the earnings deflator and continue to find a positive coefficient on $res\_\Delta earn\_dom_q$ and a negative coefficient on $res\_\Delta earn\_for_q$ in both the AR(1) and AR(2) specifications, but the coefficients are not statistically significant. Thus, the results in Table 8.1 provide some evidence professional forecasters do not fully incorporate the information in aggregate domestic and foreign earnings growth into U.S. GDP growth forecasts.

Next, I examine whether paper shifting impacts professional forecasters' use of the information in aggregate domestic and foreign earnings growth when they forecast U.S. GDP growth. I estimate the following equation:

$$res\_g\_final_{q+1} = \alpha + \beta_1 Shift\_rank_q + \beta_2 res\_\Delta earn\_dom_q + \beta_3 Shift\_rank_q \times res\_\Delta earn\_dom_q + \beta_4 res\_\Delta earn\_for_q + \beta_5 Shift\_rank_q \times res\_\Delta earn\_for_q + \gamma_1 res\_E_q(g_{q+1}) + \gamma_2 res\_g\_adv_q + \gamma_3 res\_Inf_q + \varepsilon_{q+1} \quad (9)$$

A significant β_2 (β_4) indicates that when paper shifting is low, aggregate domestic (foreign) earnings growth contains information for future U.S. GDP growth incremental to GDP growth forecasts. In other words, when paper shifting is low, professional forecasters do not fully incorporate the information in aggregate domestic (foreign) earnings growth into their GDP growth forecasts.

A significant β_3 (β_5) of the same sign as β_2 (β_4) indicates that as paper shifting increases, aggregate domestic (foreign) earnings growth contains more information for future U.S. GDP growth incremental to GDP growth forecasts. This is consistent with the information in aggregate domestic (foreign) earnings growth that professional forecasters incorporate deviating further from the information that should be incorporated as paper shifting increases. Conversely, a significant β_3 (β_5) of the opposite sign of β_2 (β_4) indicates that as paper shifting increases, aggregate domestic (foreign) earnings growth contains less information for future U.S. GDP growth incremental to GDP growth forecasts. This is consistent with the information in aggregate domestic (foreign) earnings growth that professional forecasters incorporate deviating less from the information that should be incorporated as paper shifting increases. Because it is unclear *ex ante* whether and how professional forecasters change their use of the information in response to paper shifting, I make no predictions for β_2 to β_5.

I present the results in Table 8.2. In Column (1), I use sales as the earnings deflator and AR(1) models to obtain shock form variables. The coefficient on $res\_\Delta earn\_dom_q$ is positive and significant, indicating that when paper shifting is low aggregate domestic earnings growth contains information for future U.S. GDP growth incremental to GDP growth forecasts. This result suggests professional forecasters do not fully incorporate the information in aggregate domestic earnings growth into U.S. GDP growth forecasts. The coefficient on $Shift\_rank_q \times res\_\Delta earn\_dom_q$ is negative and significant, indicating that as paper shifting increases, aggregate domestic earnings growth contains less incremental information for future U.S. GDP growth. This result is consistent with the information in aggregate domestic earnings growth incorporated by professional forecasters getting closer to the information that should be incorporated as paper shifting increases. This could be due to the findings in Table 6.1 that paper

shifting diminishes the informativeness of aggregate domestic earnings growth, and professional forecasters do not adjust their use of the information.

For aggregate foreign earnings growth, the negative and significant coefficient on $res\_\Delta earn\_for_q$ in Column (1) indicates that when paper shifting is low aggregate foreign earnings growth contains information for future U.S. GDP growth incremental to GDP growth forecasts. This result suggests professional forecasters do not fully incorporate the information in aggregate foreign earnings growth in U.S. GDP forecasts. The coefficient on $Shift\_rank_q \times res\_\Delta earn\_for_q$ is positive but not significant.

In Column (2), I obtain shock form variables using AR(2) models and draw similar conclusions. I use market value of equity as an alternative earnings deflator in Columns (3) and (4). For aggregate domestic earnings growth, the coefficient on $res\_\Delta earn\_dom_q$ is positive and significant, while the coefficient on $Shift\_rank_q \times res\_\Delta earn\_dom_q$ is negative but not significant. For aggregate foreign earnings growth, the coefficient on $res\_\Delta earn\_for_q$ is negative and significant, and the coefficient on $Shift\_rank_q \times res\_\Delta earn\_for_q$ is positive and significant. These results indicate that as paper shifting increases, the incremental information in aggregate foreign earnings growth decreases. This evidence is consistent with the information in aggregate foreign earnings growth incorporated by professional forecasters getting closer to the information that should be incorporated as paper shifting increases. This is probably because the informativeness of aggregate foreign earnings growth declines with paper shifting, and professional forecasters do not change their use of the information accordingly.

In summary, the results provide evidence that when paper shifting is low professional forecasters do not fully incorporate the information in aggregate domestic and foreign earnings growth into U.S. GDP growth forecasts. As paper shifting increases, the information in aggregate

domestic and foreign earnings growth incorporated by professional forecasters gets closer to the information that should be incorporated.

8. ADDITIONAL TESTS

8.1. Alternative Tests of GDP Growth Forecasts

I also conduct the GDP growth forecast tests using an alternative research design. First, I examine whether the information in aggregate domestic and foreign earnings growth predicts GDP growth forecast errors. I estimate the following equation:

$$g\_final_{q+1} - E_q(g_{q+1}) = \alpha + \beta_1 res\_\Delta earn\_dom_q + \beta_2 res\_\Delta earn\_for_q + \gamma_1 res\_g\_adv_q + \gamma_2 res\_inf_q + \varepsilon_{q+1} \quad (10)$$

The dependent variable is GDP growth forecast error, which equals realized real GDP growth less the GDP growth forecast. Compared to Equation (8), the results of Equation (10) are more straightforward to interpret, but the coefficient on $E_q(g_{q+1})$ is restricted to be one (Konchitchki and Patatoukas 2014a; Gaertner et al. 2020). I expect β_1 and β_2 to be significant, consistent with aggregate domestic and foreign earnings growth predicting GDP growth forecast errors, and therefore professional forecasters not fully incorporating the information in aggregate domestic and foreign earnings growth into their GDP growth forecasts. [29]

Table 9.1 presents the results. The inferences remain the same as the original GDP growth forecast tests. The coefficient on $res\_\Delta earn\_dom_q$ is positive and significant in Columns (3) and (4), indicating that professional forecasters underreact to the information in aggregate domestic earnings growth when making GDP growth forecasts. The coefficient on $res\_\Delta earn\_for_q$ is negative and significant in Columns (1) and (2), indicating that professional forecasters underreact to the information in aggregate foreign earnings growth.

[29] Similar to the main tests of GDP growth forecasts, I only predict β_2 will be significant if aggregate foreign earnings growth conveys information for future U.S. GDP growth when paper shifting is not considered (as shown in Table 5.1, Columns (1) and (2)). Because it is difficult to interpret β_2 when there is no evidence showing aggregate foreign earnings contains information about future GDP growth.

Next, I examine whether the association of aggregate domestic and foreign earnings growth with forecast errors changes with paper shifting. I estimate the following equation:

$$g\_final_{q+1} - E_q(g_{q+1}) = \alpha + \beta_1 Shift\_rank_q + \beta_2 res\_\Delta earn\_dom_q + \beta_3 Shift\_rank_q \times res\_\Delta earn\_dom_q + \beta_4 res\_\Delta earn\_for_q + \beta_5 Shift\_rank_q \times res\_\Delta earn\_for_q + \gamma_1 res\_g\_adv_q + \gamma_2 res\_Inf_q + \varepsilon_{q+1} \quad (11)$$

It is unclear whether the ability of aggregate domestic and foreign earnings growth to predict forecast errors changes with paper shifting.

Table 9.2 presents the results. I draw similar inferences using this alternative research design. The coefficient on $res\_\Delta earn\_dom_q$ ($res\_\Delta earn\_for_q$) is positive (negative) and significant in all columns, indicating that when paper shifting is low professional forecasters underreact to the information in aggregate domestic (foreign) earnings growth when they make GDP growth forecasts. The coefficient on $Shift\_rank_q \times res\_\Delta earn\_dom_q$ is negative and significant in Columns (1) and (2), indicating that the ability of aggregate domestic earnings growth to predict forecast errors decreases with paper shifting. This is consistent with the information in aggregate domestic earnings growth incorporated by professional forecasters getting closer to the information that should be incorporated as paper shifting increases. The coefficient on $Shift\_rank_q \times res\_\Delta earn\_for_q$ is positive and significant in Column (4), indicating that the ability of aggregate foreign earnings growth to predict forecast errors decreases with paper shifting. This is consistent with the information in aggregate foreign earnings growth incorporated by professional forecasters getting closer to the information that should be incorporated as paper shifting increases. In summary, I draw similar inferences using this alternative research design.

8.2. Effect of Inbound and Outbound Paper Shifting on the Informativeness of Aggregate Domestic and Foreign Earnings Growth

In my main analyses, I do not differentiate between inbound and outbound paper shifting because they both create noise in reported domestic and foreign earnings growth relative to the location of economic activities, and thus I expect both should reduce the informativeness of aggregate domestic and foreign earnings growth for predicting future GDP growth. To explore the role of inbound and outbound paper shifting, I separately examine the effect of inbound and outbound paper shifting on the informativeness of aggregate domestic and foreign earnings growth for future GDP growth. First, I construct quarterly inbound and outbound paper shifting measures by estimating the following equation for each quarter using firm-quarter observations:

$$FRoFA_{i,q} = \alpha_0 + \alpha_1 RoFA_{i,q} + \alpha_2 HighFTR\_AVE_{i,q} + \alpha_3 LowFTR\_AVE_{i,q} \times FTR\_AVE_{i,q} + \alpha_4 HighFTR\_AVE_{i,q} \times FTR\_AVE_{i,q} + Industry\ FE + \varepsilon_{i,q} \quad (12)$$

$LowFTR\_AVE_{i,q}$ ($HighFTR\_AVE_{i,q}$) is an indicator of negative (positive) $FTR\_AVE_{i,q}$, indicating an incentive to shift income into (out of) the U.S. A positive α_3 (α_4) is interpreted as the evidence of tax-motivated inbound (outbound) paper shifting, because it indicates an association between an incentive to shift income into (out of) the U.S and a lower (higher) foreign return on fixed assets. $InShift_q$ ($OutShift_q$) equals α_3 (α_4) if α_3 (α_4) is positive and zero otherwise.

Table 10.1 provides descriptive statistics for $InShift_q$ and $OutShift_q$. These measures are somewhat noisy, as only 26.5% of α_3 and 14.4% of α_4 are significant at 0.10 level using a two-tailed test (untabulated).[30] To mitigate the impact of the noise in $InShift_q$ and $OutShift_q$

[30] In comparison, when constructing $Shift_q$ 56.8% of the coefficients on $FTR\_AVE_{i,q}$ (α_2) in Equation (5) are significant (untabulated). Because $InShift_q$ and $OutShift_q$ are noisier than $Shift_q$, I may not find evidence of the effect of inbound and outbound paper shifting as I do for overall paper shifting.

on my empirical tests, I transform them into $InShift\_rank_q$ and $OutShift\_rank_q$, which are scaled rank variables ranging from zero to one, by dividing $InShift_q$ and $OutShift_q$ into quintiles.

After constructing the quarterly inbound and outbound paper shifting measures ($InShift\_rank_q$ and $OutShift\_rank_q$), I estimate the following equation to separately examine the effect of inbound and outbound paper shifting on the informativeness of aggregate domestic and foreign earnings growth for future GDP growth:

$$res\_g\_final_{q+1} = \alpha + \beta_1 InShift\_rank_q + \beta_2 OutShift\_rank_q + \beta_3 res\_\Delta earn\_dom_q + \beta_4 InShift\_rank_q \times res\_\Delta earn\_dom_q + \beta_5 OutShift\_rank_q \times res\_\Delta earn\_dom_q + \beta_6 res\_\Delta earn\_for_q + \beta_7 InShift\_rank_q \times res\_\Delta earn\_for_q + \beta_8 OutShift\_rank_q \times res\_\Delta earn\_for_q + \gamma_1 res\_g\_adv_q + \gamma_2 res\_Inf_q + \varepsilon_{q+1} \quad (13)$$

I expect β_4 and β_5 (β_7 and β_8) will have the opposite signs of β_3 (β_6), indicating that inbound and outbound paper shifting reduce the informativeness of aggregate domestic (foreign) earnings growth for future U.S. GDP growth.

I present the results in Table 10.2. For aggregate domestic earnings growth, the coefficient on $res\_\Delta earn\_dom_q$ is positive and significant in all columns, indicating when paper shifting is low aggregate domestic earnings growth is positively associated with future GDP growth. The coefficient on $InShift\_rank_q \times res\_\Delta earn\_dom_q$ is negative but not significant. The coefficient on $OutShift\_rank_q \times res\_\Delta earn\_dom_q$ is negative and significant in Column (2), consistent with outbound paper shifting reducing the informativeness of aggregate domestic earnings growth. For aggregate foreign earnings growth, the coefficient on $res\_\Delta earn\_for_q$ is negative and significant across all columns, which indicates that aggregate foreign earnings growth is negatively associated with future GDP growth when paper shifting is low. The

coefficient on $InShift\_rank_q \times res\_\Delta earn\_for_q$ is positive and significant in Columns (1) and (2), consistent with inbound paper shifting decreasing the informativeness of aggregate foreign earnings growth. The coefficient on $OutShift\_rank_q \times res\_\Delta earn\_for_q$ is insignificant.

In summary, in these exploratory tests I find evidence that outbound (inbound) paper shifting reduces the ability of aggregate domestic (foreign) earnings growth to predict future GDP growth. The reason I do not find evidence of the effect of inbound and outbound paper shifting on both aggregate domestic and foreign earnings growth could be the noise in the inbound and outbound paper shifting measures, which is greater than the noise in the overall paper shifting measure.

9. CONCLUSION

I investigate whether tax-motivated income shifting, specifically paper shifting, decreases the informativeness of aggregate accounting earnings for predicting future GDP growth. I document that aggregate domestic and foreign earnings growth contain different information for future U.S. GDP growth. Because paper shifting distorts the link between reported domestic and foreign earnings and economic activities, I predict and find that paper shifting reduces the informativeness of aggregate domestic and foreign earnings growth for forecasting future U.S. GDP growth. Potential mechanisms are that paper shifting reduces the ability of aggregate domestic and foreign earnings growth to predict future growth in domestic business investment, employment, and personal consumption, which impact future GDP growth. I then examine professionals' GDP growth forecasts and find when paper shifting is low, professional forecasters do not fully incorporate the information in aggregate domestic and foreign earnings growth into their GDP growth forecasts. As paper shifting increases, the information incorporated by professional forecasters gets closer to the information embedded in aggregate domestic and foreign earnings growth. This is consistent with the main findings that paper shifting decreases the informativeness of aggregate domestic and foreign earnings growth for forecasting future U.S. GDP growth, and professional foresters do not adjust their use of the information accordingly.

This study advances our understanding of the consequences of tax-motivated income shifting. Prior studies focus on firm-level effects (Chen et al. 2018; De Simone et al. 2022). My study elevates the focus from the micro to macro level. The evidence presented shows that paper shifting reduces the informativeness of aggregate domestic and foreign earnings growth for future U.S. GDP growth, indicating that paper shifting impairs our ability to forecast

macroeconomic outcomes using accounting earnings. Further, I develop a method to identify paper shifting, which can be applied in future research. Second, this study contributes to research on the informativeness of aggregate accounting earnings for macroeconomic outcomes. It highlights the effect of paper shifting on the informativeness of aggregate domestic and foreign earnings growth, which has been missing in the macro-accounting literature. The findings in this paper shed light on how to improve GDP growth forecasts, which can assist governments and business leaders in making informed decisions.

TABLES

Table 1.1: Validation of Paper Shifting Model - Sample Selection

	Firm Years
Observations of U.S. multinational firms from 1988 to 2021	98,129
Less: Observations in utilities (SIC 4900-4999) and financial services (SIC 6000-6999)	-19,100
Less: Observations with three-year cumulative domestic or foreign pretax losses	-53,020
Less: Observations with missing *FRoFA, RoFA, FTR_AVE,* 3-digit SIC codes	-6,090
Sample for time trend of paper shifting by year (A)	19,919
Less: Observations missing intangible intensity (B)	-359
Sample using intangible intensity as a proxy for paper shifting ability (A-B)	19,560
Less: Observations missing tax haven use intensity (C)	-12,265
Sample using haven use intensity as a proxy for paper shifting ability (A-C)	7,654
Less: Observations missing High-Tech industry membership (D)	0
Sample using High-Tech industry membership as a proxy for paper shifting ability (A-D)	19,919

This table describes the sample used in the validation tests of the paper shifting model. It outlines the sample selection of the U.S. MNCs that are used to validate the paper shifting model.

Table 1.2: Validation of Paper Shifting Model - Descriptive Statistics

	n	Mean	Std. Dev.	Min	P10	P25	P50	P75	P90	Max
$FRoFA_{i,t}$	19,919	1.403	2.764	-0.504	0.065	0.216	0.521	1.283	3.277	18.707
$RoFA_{i,t}$	19,919	0.840	1.171	-0.383	0.073	0.211	0.474	0.979	1.941	7.316
$FRoS_{i,t}$	19,919	0.108	0.108	-0.061	0.013	0.039	0.082	0.143	0.234	0.597
$RoS_{i,t}$	19,919	0.109	0.088	-0.076	0.020	0.051	0.093	0.149	0.226	0.424
$FTR\_AVE_{i,t}$	19,919	0.000	0.269	-1.000	-0.248	-0.068	0.037	0.141	0.255	0.586
$IntanIn_{i,t}$	19,560	0.053	0.065	0.000	0.000	0.004	0.027	0.075	0.154	0.284
$HavenIn_{i,t}$	7,654	0.180	0.182	0.000	0.000	0.052	0.146	0.250	0.381	1.000
$HighTech_{i,t}$	19,919	0.273	0.445	0.000	0.000	0.000	0.000	1.000	1.000	1.000

This table describes the sample used in the validation tests of the paper shifting model. It provides descriptive statistics of variables that are used in the validation tests. Appendix B provides complete variable definitions.

Table 2.1: Cross-sectional Variation in the Strength of Paper Shifting

$$FRoFA_{i,t} = \alpha_0 + \alpha_1 RoFA_{i,t} + \alpha_2 FTR\_AVE_{i,t} + \alpha_3 Ability_{i,t} + \alpha_4 FTR\_AVE_{i,t} \times Ability_{i,t} + Industry\ FE + Year\ FE + \varepsilon_{i,t}$$
$$FRoS_{i,t} = \alpha_0 + \alpha_1 RoS_{i,t} + \alpha_2 FTR\_AVE_{i,t} + \alpha_3 Ability_{i,t} + \alpha_4 FTR\_AVE_{i,t} \times Ability_{i,t} + Industry\ FE + Year\ FE + \varepsilon_{i,t}$$

Paper Shifting Ability (*Ability* $_{i,t}$)	**Predicted Sign**	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
		Intangible Intensity		**Tax Haven Use Intensity**		**High-Tech Industry**	
Dependent Variable		***FRoFA*** $_{i,t}$	***FRoS*** $_{i,t}$	***FRoFA*** $_{i,t}$	***FRoS*** $_{i,t}$	***FRoFA*** $_{i,t}$	***FRoS*** $_{i,t}$
Constant		-0.049	0.071 ***	-0.155 *	0.042 ***	0.172 **	0.067 ***
		(-0.67)	(13.55)	(-1.76)	(7.16)	(2.31)	(14.59)
RoFA $_{i,t}$/*RoS* $_{i,t}$	+	1.210 ***	0.572 ***	1.253 ***	0.580 ***	1.211 ***	0.565 ***
		(19.97)	(23.66)	(15.43)	(19.50)	(20.22)	(24.28)
FTR_AVE $_{i,t}$	+	0.491 ***	0.067 ***	0.620 ***	0.059 ***	0.688 ***	0.067 ***
		(6.06)	(12.16)	(4.06)	(10.30)	(8.28)	(18.08)
Ability $_{i,t}$		0.287 ***	-0.009 **	0.214 **	0.013 ***		
		(4.07)	(-2.17)	(2.53)	(3.73)		
FTR_AVE $_{i,t}$ ***×Ability*** $_{i,t}$	+	1.217 ***	0.042 ***	0.913 ***	0.052 ***	1.372 ***	0.068 ***
		(6.17)	(5.46)	(3.40)	(4.68)	(4.98)	(6.58)
$\frac{Coefficient\ on\ FTR\_AVEi,t \times Abilityi,t}{Coefficient\ on\ FTR\_AVEi,t}$		2.479	0.627	1.473	0.881	1.994	1.015
Industry Fixed Effects		Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects		Yes	Yes	Yes	Yes	Yes	Yes
Firm Clustered Standard Errors		Yes	Yes	Yes	Yes	Yes	Yes
Observations		19,560	19,474	7,654	7,636	19,919	19,831
Adj. R-squared		0.391	0.407	0.410	0.451	0.391	0.408

This table presents the results of examining cross-sectional variation in the association between foreign return on fixed assets ($FRoFA_{i,t}$) or foreign return on sales ($FRoS_{i,t}$) and foreign tax rate differential ($FTR\_AVE_{i,t}$) by including an indicator variable for paper shifting ability ($Ability_{i,t}$) and its interactions with $FTR\_AVE_{i,t}$ as shown in the equations above. I use three measures to proxy for paper shifting ability: intangible intensity ($IntanIn_{i,t}$), tax haven use intensity ($HavenIn_{i,t}$), and membership in the High-Tech industry ($HighTech_{i,t}$). The coefficient on $Ability_{i,t}$ is omitted in Columns (5) and (6) because of

Table 2.1 (cont'd)

multicollinearity with industry fixed effects. All variables are firm-year measures. ***, **, * denote significance at the 0.01, 0.05, and 0.10 levels (two-tailed). Appendix B provides complete variable definitions.

Table 3.1: Observations Used to Construct Aggregate Accounting Earnings

	Firm Years
Quarterly observations of U.S. domestic and multinational firms from 1988 to 2021	1,182,280
Less: Observations with missing domestic earnings, foreign earnings, domestic earnings growth, and foreign earnings growth	-468,698
Less: Observations with missing market value of equity	-70,389
Less: Observations with missing quarterly earnings announcement date	-40,786
Less: observations in the top and bottom one percentile of domestic earnings, foreign earnings, domestic earnings growth, and foreign earnings growth	-47,995
Sample to construct aggregate accounting earnings	554,412

This table describes the process of selecting observations to construct aggregate accounting earnings.

Table 4.1: Descriptive Statistics

	n	Mean	Std. Dev.	Min	P10	P25	P50	P75	P90	Max
g_final_{q+1}	132	2.497	2.301	-6.342	0.379	1.426	2.504	3.835	5.363	8.203
g_adv_q	131	2.501	1.976	-6.144	0.501	1.537	2.464	3.534	4.824	7.155
$Shift_q$	132	0.308	0.201	0.000	0.068	0.147	0.279	0.451	0.559	0.880
$\Delta earn\_dom_q$	132	0.001	0.027	-0.094	-0.026	-0.010	0.001	0.013	0.025	0.103
$\Delta earn\_for_q$	132	-0.001	0.005	-0.013	-0.008	-0.004	0.000	0.003	0.005	0.013

This table presents descriptive statistics for the main variables. Appendix B provides complete variable definitions. The sample contains quarterly data from Q1: 1988 to Q4: 2021, except the quarterly data in 2020. The advance estimate of GDP growth (g_adv_q) is unavailable in Q4:1994 due to the government shutdown.

Table 4.2: Pearson Correlation Matrix

	(1)	(2)	(3)	(4)	(5)
(1) $res\_g\_final_{q+1}$	1.000				
(2) $res\_g\_adv_q$	-0.054	1.000			
(3) $Shift_q$	-0.043	0.083	1.000		
(4) $res\_\Delta earn\_dom_q$	**0.186**	**0.335**	0.028	1.000	
(5) $res\_\Delta earn\_for_q$	-0.130	0.168	-0.075	**0.335**	1.000

This table presents Pearson correlations among the main variables. Correlation coefficients in bold are significantly different from zero at the 0.05 level or better. Appendix B provides complete variable definitions. The sample contains quarterly data from Q1: 1988 to Q4: 2021, except the quarterly data in 2020. The advance estimate of GDP growth (g_adv_q) is unavailable in Q4:1994 due to the government shutdown.

Table 5.1: Aggregate Domestic and Foreign Earnings Growth and Future GDP Growth

$$res\_g\_final_{q+1} = \alpha + \beta_1 res\_\Delta earn\_dom_q + \beta_2 res\_\Delta earn\_for_q + \gamma_1 res\_g\_adv_q + \gamma_2 res\_inf_q + \varepsilon_{q+1}$$

Earnings Deflator		**(1)**		**(2)**		**(3)**		**(4)**	
		Sales				**Market Value**			
Autoregressive Model	**Predicted Sign**	**AR(1)**		**AR(2)**		**AR(1)**		**AR(2)**	
Constant		-0.023		-0.013		-0.023		-0.013	
		(-0.13)		(-0.07)		(-0.12)		(-0.07)	
res_Δearn_dom $_q$	+	32.237	***	32.004	***	150.621	***	157.667	***
		(3.21)		(3.35)		(2.63)		(2.65)	
res_Δearn_for $_q$	?	-98.057	**	-95.964	**	-343.729		-355.221	
		(-2.28)		(-2.27)		(-1.40)		(-1.38)	
res_g_adv $_q$		-0.144		-0.143		-0.130		-0.142	
		(-1.15)		(-1.16)		(-1.04)		(-1.14)	
res_Inf $_q$		0.026		-2.991		-3.807		-5.151	
		(0.00)		(-0.11)		(-0.16)		(-0.21)	
Difference between β_1 and β_2		130.294	***	127.968	***	494.350	**	512.888	*
		(2.91)		(2.92)		(1.84)		(1.81)	
Observations		130		129		130		129	
Adj. R-squared		0.058		0.058		0.029		0.033	

This table presents the results of examining the informativeness of aggregate domestic and foreign earnings growth for future GDP growth. The sample contains quarterly data from Q1: 1988 to Q4: 2021, except the quarterly data in 2020. All variables are measured as residuals from autoregressive models of different orders (i.e., AR(1) and AR(2)). I use sales as the earnings deflator in Columns (1) and (2) and market value as the earnings deflator in Columns (3) and (4). ***, **, * denote significance at the 0.01, 0.05, and 0.10 levels (two-tailed). Appendix B provides complete variable definitions.

Table 6.1: Effect of Paper Shifting on the Informativeness of Aggregate Domestic and Foreign Earnings Growth

$$res\_g\_final_{q+1} = \alpha + \beta_1 Shift\_rank_q + \beta_2 res\_\Delta earn\_dom_q + \beta_3 Shift\_rank_q \times res\_\Delta earn\_dom_q + \beta_4 res\_\Delta earn\_for_q + \beta_5 Shift\_rank_q \times res\_\Delta earn\_for_q + \gamma_1 res\_g\_adv_q + \gamma_2 res\_Inf_q + \varepsilon_{q+1}$$

Earnings Deflator		**(1)**	**(2)**	**(3)**	**(4)**
		Sales		**Market Value**	
Autoregressive Model	**Predicted Sign**	**AR(1)**	**AR(2)**	**AR(1)**	**AR(2)**
Constant		0.22	0.26	0.19	0.21
		(0.67)	(0.81)	(0.56)	(0.60)
Shift_rank $_q$		-0.42	-0.47	-0.31	-0.33
		(-0.75)	(-0.84)	(-0.56)	(-0.58)
res_Δearn_dom $_q$	+	82.17 ***	83.74 ***	285.60 ***	291.19 **
		(4.93)	(4.89)	(2.69)	(2.58)
Shift_rank $_q$ × ***res_Δearn_dom*** $_q$	-	-85.25 ***	-88.80 ***	-250.91 *	-246.67
		(-3.86)	(-3.85)	(-1.67)	(-1.58)
res_Δearn_for $_q$	?	-187.90 **	-179.61 **	-1101.03 ***	-1116.27 ***
		(-2.44)	(-2.37)	(-2.91)	(-2.87)
Shift_rank $_q$ × ***res_Δearn_for*** $_q$	?	173.02	161.54	1604.14 **	1601.42 **
		(1.56)	(1.49)	(2.56)	(2.45)
res_g_adv $_q$		-0.18	-0.18	-0.20	-0.20
		(-1.57)	(-1.53)	(-1.63)	(-1.59)
res_Inf $_q$		-6.93	-11.33	-2.78	-6.01
		(-0.32)	(-0.51)	(-0.14)	(-0.30)
Combined effect					
β_2+β_3		-3.08	-5.06	34.70	44.51
		(-0.27)	(-0.45)	(0.44)	(0.56)
β_4+β_5		-14.88	-18.07	503.11	485.16
		(-0.25)	(-0.30)	(1.32)	(1.20)
Observations		130	129	130	129
Adj. R-squared		0.109	0.116	0.094	0.097

This table presents the results of examining the effect of paper shifting on the informativeness of aggregate domestic and foreign earnings growth for future GDP growth. The sample contains quarterly data from Q1: 1988 to Q4: 2021, except the quarterly data in 2020. All variables except $Shift\_rank_q$ are measured as residuals from autoregressive models of different orders (i.e., AR(1) and AR(2)). I use sales as the earnings deflator in Columns (1) and (2) and market value as the earnings deflator in Columns (3) and (4). ***, **, * denote significance at the 0.01, 0.05, and 0.10 levels (two-tailed). Appendix B provides complete variable definitions.

Table 7.1: Aggregate Domestic and Foreign Earnings Growth and Future Growth in Business Investment, Employment, and Personal Consumption

$$res\_inv\_final_{q+1}\ (or\ res\_emp\_final_{q+1}\ or\ res\_con\_final_{q+1}) = \alpha + \beta_1 res\_\Delta earn\_dom_q + \beta_2 res\_\Delta earn\_for_q + \gamma_1 res\_inv\_adv_q\ (or\ res\_emp\_adv_q\ or\ res\_con\_adv_q) + \gamma_2 res\_inf_q + \varepsilon_{q+1}$$

Future Macroeconomic Outcome	Predicted Sign	(1) Business Investment	(2) Employment	(3) Personal Consumption
Constant		-0.125	0.000	0.002
		(-0.20)	(0.00)	(0.01)
res_Δearn_dom $_q$	+	96.319 **	16.565 **	26.568 **
		(2.48)	(2.55)	(2.44)
res_Δearn_for $_q$	?	-113.829	-51.499 **	-45.610
		(-0.59)	(-1.98)	(-1.19)
res_inv_adv $_q$*/res_emp_adv* $_q$*/res_con_adv* $_q$		-0.058	-0.064	-0.210 *
		(-0.59)	(-0.39)	(-1.82)
res_inf $_q$		74.614	9.347	-36.564 *
		(0.73)	(0.76)	(-1.69)
Difference between β_1 and β_2		210.148	68.064 **	72.178 *
		(0.98)	(2.35)	(1.75)
Observations		130	132	130
Adj. R-squared		0.049	0.037	0.042

This table presents the results of examining the informativeness of aggregate domestic and foreign earnings growth for future growth in domestic business investment, employment, and personal consumption. The sample contains quarterly data from Q1: 1988 to Q4: 2021, except the quarterly data in 2020. All variables except $Shift\_rank_q$ are measured as residuals from autoregressive models AR(1). I use sales as the earnings deflator. ***, **, * denote significance at the 0.01, 0.05, and 0.10 levels (two-tailed). Appendix B provides complete variable definitions.

Table 7.2: Effect of Paper Shifting on the Informativeness of Aggregate Domestic and Foreign Earnings Growth for Future Growth in Business Investment, Employment, and Personal Consumption

$$res\_inv\_final_{q+1}\ (or\ res\_emp\_final_{q+1}\ \ or\ res\_con\_final_{q+1}) = \alpha + \beta_1 Shift\_rank_q + \beta_2 res\_\Delta earn\_dom_q + \beta_3 Shift\_rank_q \times res\_\Delta earn\_dom_q + \beta_4 res\_\Delta earn\_for_q + \beta_5 Shift\_rank_q \times res\_\Delta earn\_for_q + \gamma_1 res\_inv\_adv_q\ (or\ res\_emp\_adv_q\ or\ res\_con\_adv_q) + \gamma_2 res\_Inf_q + \varepsilon_{q+1}$$

Future Macroeconomic Outcome	Predicted Sign	(1) Business Investment	(2) Employment	(3) Personal Consumption
Constant		0.42	-0.11	0.01
		(0.36)	(-0.48)	(0.02)
Shift_rank $_q$		-0.73	0.26	0.06
		(-0.45)	(0.69)	(0.09)
res_Δearn_dom $_q$	+	329.34 ***	44.72 ***	58.26 ***
		(4.95)	(3.63)	(2.69)
Shift_rank $_q$ × ***res_Δearn_dom*** $_q$	-	-406.98 ***	-50.44 ***	-54.11 **
		(-4.40)	(-3.19)	(-2.20)
res_Δearn_for $_q$	?	-510.67	-95.90 **	-158.37 **
		(-1.31)	(-2.08)	(-2.05)
Shift_rank $_q$ × ***res_Δearn_for*** $_q$	?	791.49	94.77	208.25 *
		(1.53)	(1.42)	(1.77)
res_inv_adv $_q$*/res_emp_adv* $_q$*/res_con_adv* $_q$		-0.08	-0.07	-0.27 **
		(-1.00)	(-0.44)	(-2.49)
res_Inf $_q$		36.88	4.33	-38.62
		(0.58)	(0.42)	(-1.61)
Combined effect				
$\beta_2+\beta_3$		-77.64 *	-5.72	4.15
		(-1.71)	(-0.73)	(0.38)
$\beta_4+\beta_5$		280.82	-1.13	49.89
		(1.39)	(-0.03)	(0.80)
Observations		130	132	130
Adj. R-squared		0.167	0.090	0.049

This table presents the results of examining the effect of paper shifting on the informativeness of aggregate domestic and foreign earnings growth for future growth in domestic business investment, employment, and personal consumption. The sample contains quarterly data from Q1: 1988 to Q4: 2021, except the quarterly data in 2020. All variables except $Shift\_rank_q$ are measured as residuals from autoregressive models AR(1). I use sales as the earnings deflator. ***, **, * denote significance at the 0.01, 0.05, and 0.10 levels (two-tailed). Appendix B provides complete variable definitions.

Table 8.1: GDP Growth Forecasts - Aggregate Domestic and Foreign Earnings Growth and GDP Growth Forecasts

$$res\_g\_final_{q+1} = \alpha + \beta_1 res\_\Delta\boldsymbol{earn}\_dom_q + \beta_2 res\_\Delta earn\_for_q + \gamma_1 res\_E_q(g_{q+1}) + \gamma_2 res\_g\_adv_q + \gamma_3 res\_inf_q + \varepsilon_{q+1}$$

Earnings Deflator		**(1)**	**(2)**	**(3)**	**(4)**
		Sales		**Market Value**	
Autoregressive Model	**Predicted Sign**	**AR(1)**	**AR(2)**	**AR(1)**	**AR(2)**
Constant		0.016	0.025	0.014	0.022
		(0.10)	(0.15)	(0.08)	(0.13)
res_Δearn_dom $_q$	?	14.253	14.652 *	71.011	73.180
		(1.59)	(1.68)	(1.38)	(1.39)
res_Δearn_for $_q$	?	-70.592 *	-72.191 *	-69.903	-96.959
		(-1.84)	(-1.94)	(-0.32)	(-0.43)
$res\_E_q(g_{q+1})$		0.786 ***	0.777 ***	0.825 ***	0.812 ***
		(3.66)	(3.65)	(3.79)	(3.73)
$res\_g\_adv_q$		-0.159 *	-0.138	-0.169	-0.153
		(-1.61)	(-1.38)	(-1.60)	(-1.44)
res_Inf_q		-5.303	-7.448	-13.670	-14.772
		(-0.25)	(-0.35)	(-0.67)	(-0.72)
Observations		130	129	130	129
Adj. R-squared		0.183	0.188	0.168	0.171

This table presents the results of examining whether professional forecasters fully incorporate the information contained in aggregate domestic and foreign earnings growth when they forecast U.S. GDP growth. The sample contains quarterly data from Q1: 1988 to Q4: 2021, except the quarterly data in 2020. All variables except $Shift\_rank_q$ are measured as residuals from autoregressive models of different orders (i.e., AR(1) and AR(2)). I use sales as the earnings deflator in Columns (1) and (2) and market value as the earnings deflator in Columns (3) and (4). ***, **, * denote significance at the 0.01, 0.05, and 0.10 levels (two-tailed). Appendix B provides complete variable definitions.

Table 8.2: GDP Growth Forecasts - Paper Shifting, Aggregate Domestic and Foreign Earnings Growth, and GDP Growth Forecasts

$$res\_g\_final_{q+1} = \alpha + \beta_1 Shift\_rank_q + \beta_2 res\_\Delta earn\_dom_q + \beta_3 Shift\_rank_q \times res\_\Delta earn\_dom_q + \beta_4 res\_\Delta earn\_for_q + \beta_5 Shift\_rank_q \times res\_\Delta earn\_for_q + \gamma_1 res\_E_q(g_{q+1}) + \gamma_2 res\_g\_adv_q + \gamma_3 res\_Inf_q + \varepsilon_{q+1}$$

Earnings Deflator		**(1)**	**(2)**	**(3)**	**(4)**
		Sales		**Market Value**	
Autoregressive Model	**Predicted Sign**	**AR(1)**	**AR(2)**	**AR(1)**	**AR(2)**
Constant		0.32	0.36	0.29	0.31
		(1.14)	(1.24)	(1.00)	(1.05)
Shift_rank $_q$		-0.57	-0.61	-0.47	-0.47
		(-1.13)	(-1.19)	(-0.95)	(-0.96)
res_Δearn_dom $_q$	?	46.98 ***	47.79 ***	173.03 **	179.14 **
		(2.78)	(2.92)	(2.03)	(2.02)
Shift_rank $_q$ × ***res_Δearn_dom*** $_q$	?	-53.20 **	-53.91 ***	-168.22	-175.43
		(-2.57)	(-2.66)	(-1.42)	(-1.45)
res_Δearn_for $_q$	?	-139.76 **	-135.67 **	-733.73 **	-769.07 **
		(-2.22)	(-2.22)	(-2.49)	(-2.57)
Shift_rank $_q$ × ***res_Δearn_for*** $_q$	?	122.25	111.84	1360.08 ***	1370.22 **
		(1.26)	(1.19)	(2.64)	(2.58)
res_E $_q$ *(g* $_{q+1}$*)*		0.72 ***	0.71 ***	0.77 ***	0.75 ***
		(3.12)	(3.14)	(3.79)	(3.65)
res_g_adv $_q$		-0.18 *	-0.15	-0.22 **	-0.19 *
		(-1.80)	(-1.54)	(-2.04)	(-1.74)
res_Inf $_q$		-8.43	-11.60	-11.34	-13.87
		(-0.42)	(-0.57)	(-0.62)	(-0.74)
Combined effect					
β_2+β_3		-6.21	-6.12	4.81	3.71
		(-0.62)	(-0.61)	(0.07)	(0.05)
β_4+β_5		-17.51	-23.83	626.34 *	601.15
		(-0.30)	(-0.41)	(1.74)	(1.60)
Observations		130	129	130	129
Adj. R-squared		0.200	0.206	0.215	0.219

This table presents the results of examining whether paper shifting impacts professional forecasters' use of the information contained in aggregate domestic and foreign earnings growth. The sample contains quarterly data from Q1: 1988 to Q4: 2021, except the quarterly data in 2020. All variables except $Shift\_rank_q$ are measured as residuals from autoregressive models of different orders (i.e., AR(1) and AR(2)). I use sales as the earnings deflator in Columns (1) and (2) and market value as the earnings deflator in Columns (3) and (4). ***, **, * denote significance at the 0.01, 0.05, and 0.10 levels (two-tailed). Appendix B provides complete variable definitions.

Table 9.1: Alternative Tests of GDP Growth Forecasts - Aggregate Domestic and Foreign Earnings Growth and GDP Growth Forecast Errors

$$g\_final_{q+1} - E_q(g_{q+1}) = \alpha + \beta_1 res\_\Delta earn\_dom_q + \beta_2 res\_\Delta earn\_for_q + \gamma_1 res\_g\_adv_q + \gamma_2 res\_inf_q + \varepsilon_{q+1}$$

Earnings Deflator		**(1)**	**(2)**	**(3)**	**(4)**
		Sales		**Market Value**	
Autoregressive Model	**Predicted Sign**	**AR(1)**	**AR(2)**	**AR(1)**	**AR(2)**
Constant		0.120	0.126	0.118	0.123
		(0.79)	(0.82)	(0.76)	(0.78)
res_Δearn_dom $_q$	?	13.958	13.331	79.772 *	82.856 *
		(1.59)	(1.57)	(1.82)	(1.84)
res_Δearn_for $_q$	?	-78.612 ***	-76.900 **	-125.468	-129.116
		(-2.62)	(-2.61)	(-0.71)	(-0.70)
res_g_adv $_q$		-0.025	-0.014	-0.036	-0.035
		(-0.30)	(-0.17)	(-0.43)	(-0.41)
res_Inf $_q$		-18.393	-19.548	-26.817 *	-27.562 *
		(-1.12)	(-1.18)	(-1.70)	(-1.72)
Observations		130	129	130	129
Adj. R-squared		0.029	0.029	0.006	0.008

This table presents the results of examining whether professional forecasters fully incorporate the information contained in aggregate domestic and foreign earnings growth when they forecast U.S. GDP growth using an alternative research design. The sample contains quarterly data from Q1: 1988 to Q4: 2021, except the quarterly data in 2020. All variables except $Shift\_rank_q$ are measured as residuals from autoregressive models of different orders (i.e., AR(1) and AR(2)). I use sales as the earnings deflator in Columns (1) and (2) and market value as the earnings deflator in Columns (3) and (4). ***, **, * denote significance at the 0.01, 0.05, and 0.10 levels (two-tailed). Appendix B provides complete variable definitions.

Table 9.2: Alternative Tests of GDP Growth Forecasts - Paper Shifting, Aggregate Domestic and Foreign Earnings Growth, and GDP Growth Forecast Errors

$$g\_final_{q+1} - E_q(g_{q+1}) = \alpha + \beta_1 Shift\_rank_q + \beta_2 res\_\Delta earn\_dom_q + \beta_3 Shift\_rank_q \times res\_\Delta earn\_dom_q + \beta_4 res\_\Delta earn\_for_q + \beta_5 Shift\_rank_q \times res\_\Delta earn\_for_q + \gamma_1 res\_g\_adv_q + \gamma_2 res\_Inf_q + \varepsilon_{q+1}$$

Earnings Deflator		**(1)**	**(2)**	**(3)**	**(4)**
		Sales		**Market Value**	
Autoregressive Model	**Predicted Sign**	**AR(1)**	**AR(2)**	**AR(1)**	**AR(2)**
Constant		0.56 **	0.60 **	0.54 **	0.57 **
		(2.10)	(2.18)	(1.98)	(2.04)
Shift_rank $_q$		-0.87 *	-0.92 *	-0.81 *	-0.83 *
		(-1.89)	(-1.96)	(-1.80)	(-1.86)
res_Δearn_dom $_q$	?	34.25 **	33.71 **	144.45 *	154.38 **
		(2.04)	(2.06)	(1.87)	(1.98)
Shift_rank $_q$ × ***res_Δearn_dom*** $_q$	?	-33.61 *	-33.82 *	-96.59	-109.21
		(-1.65)	(-1.67)	(-0.91)	(-1.03)
res_Δearn_for $_q$	?	-111.31 **	-107.84 **	-498.53 *	-548.68 **
		(-2.09)	(-2.05)	(-1.85)	(-2.02)
Shift_rank $_q$ × ***res_Δearn_for*** $_q$	?	54.33	50.03	756.12	848.53 *
		(0.65)	(0.61)	(1.51)	(1.65)
res_g_adv $_q$		-0.04	-0.02	-0.07	-0.06
		(-0.42)	(-0.22)	(-0.73)	(-0.62)
res_Inf $_q$		-21.89	-23.66	-27.14 *	-28.73 *
		(-1.33)	(-1.42)	(-1.77)	(-1.86)
Combined effect					
β_2+β_3		0.65	-0.11	47.87	45.17
		(0.07)	(-0.01)	(0.82)	(0.77)
β_4+β_5		-56.98	-57.81	257.60	299.85
		(-1.14)	(-1.17)	(0.76)	(0.85)
Observations		130	129	130	129
Adj. R-squared		0.048	0.050	0.036	0.047

This table presents the results of examining whether paper shifting impacts professional forecasters' use of the information contained in aggregate domestic and foreign earnings growth using an alternative research design. The sample contains quarterly data from Q1: 1988 to Q4: 2021, except the quarterly data in 2020. All variables except $Shift\_rank_q$ are measured as residuals from autoregressive models of different orders (i.e., AR(1) and AR(2)). I use sales as the earnings deflator in Columns (1) and (2) and market value as the earnings deflator in Columns (3) and (4). ***, **, * denote significance at the 0.01, 0.05, and 0.10 levels (two-tailed). Appendix B provides complete variable definitions.

Table 10.1: Effect of Inbound and Outbound Paper Shifting on the Informativeness of Aggregate Domestic and Foreign Earnings Growth - Descriptive Statistics

	n	Mean	Std. Dev.	Min	P10	P25	P50	P75	P90	Max
$InShift_q$	132	0.230	0.194	0.000	0.000	0.087	0.205	0.316	0.467	1.195
$OutShift_q$	132	0.420	0.448	0.000	0.000	0.000	0.313	0.723	1.039	1.820

This table presents descriptive statistics for the quarterly inbound and outbound paper shifting measures. The sample contains quarterly data from Q1: 1988 to Q4: 2021, except the quarterly data in 2020. All variables except $Shift\_rank_q$ are measured as residuals from autoregressive models of different orders (i.e., AR(1) and AR(2)). I use sales as the earnings deflator in Columns (1) and (2) and market value as the earnings deflator in Columns (3) and (4). ***, **, * denote significance at the 0.01, 0.05, and 0.10 levels (two-tailed). Appendix B provides complete variable definition.

Table 10.2: Effect of Inbound and Outbound Paper Shifting on the Informativeness of Aggregate Domestic and Foreign Earnings Growth - Regression Results

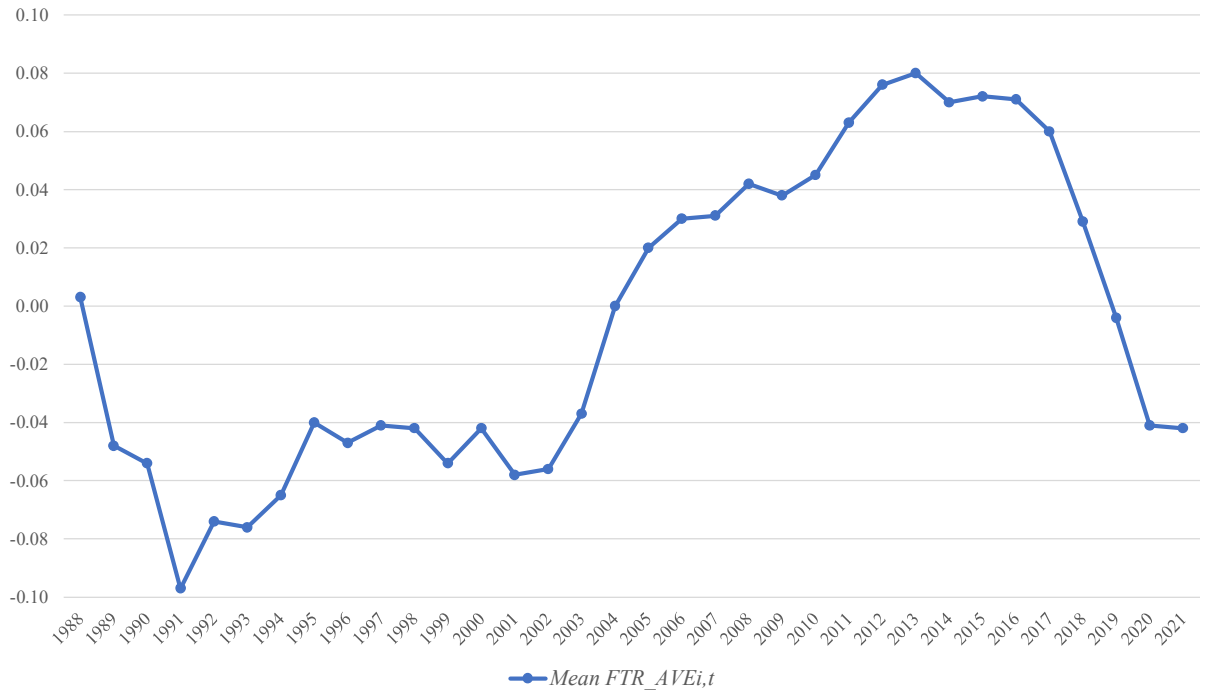
$$res\_g\_final_{q+1} = \alpha + \beta_1 InShift\_rank_q + \beta_2 OutShift\_rank_q + \beta_3 res\_\Delta earn\_dom_q + \beta_4 InShift\_rank_q \times res\_\Delta earn\_dom_q + \beta_5 OutShift\_rank_q \times res\_\Delta earn\_dom_q + \beta_6 res\_\Delta earn\_for_q + \beta_7 InShift\_rank_q \times res\_\Delta earn\_for_q + \beta_8 OutShift\_rank_q \times res\_\Delta earn\_for_q + \gamma_1 res\_g\_adv_q + \gamma_2 res\_Inf_q + \varepsilon_{q+1}$$

Earnings Deflator		**(1)** **Sales**	**(2)**	**(3)** **Market Value**	**(4)**
Autoregressive Model	**Predicted Sign**	**AR(1)**	**AR(2)**	**AR(1)**	**AR(2)**
Constant		0.36	0.42	0.42	0.44
		(0.85)	(0.95)	(0.98)	(1.00)
InShift_rank $_q$		-0.40	-0.41	-0.70	-0.69
		(-0.71)	(-0.72)	(-1.16)	(-1.14)
OutShift_rank $_q$		-0.32	-0.38	-0.04	-0.07
		(-0.66)	(-0.77)	(-0.09)	(-0.14)
res_Δearn_dom $_q$	+	59.44 **	64.59 ***	307.39 **	295.29 **
		(2.44)	(2.63)	(2.19)	(2.12)
InShift_rank $_q$ × ***res_Δearn_dom*** $_q$	-	-15.39	-14.37	-48.25	-24.36
		(-0.62)	(-0.58)	(-0.27)	(-0.14)
OutShift_rank $_q$ × ***res_Δearn_dom*** $_q$	-	-31.30	-41.92 *	-200.54	-199.79
		(-1.36)	(-1.80)	(-1.30)	(-1.28)
res_Δearn_for $_q$	-	-235.24 *	-219.18 *	-1453.73 **	-1440.62 **
		(-1.95)	(-1.85)	(-2.37)	(-2.35)
InShift_rank $_q$ × ***res_Δearn_for*** $_q$	+	277.80 **	259.31 **	1158.91	1176.77
		(2.33)	(2.21)	(1.58)	(1.58)
OutShift_rank $_q$ × ***res_Δearn_for*** $_q$	+	-38.39	-40.99	859.15	843.42
		(-0.30)	(-0.32)	(1.31)	(1.29)
res_g_adv $_q$		-0.18	-0.18	-0.21 *	-0.21 *
		(-1.56)	(-1.60)	(-1.71)	(-1.67)
res_Inf $_q$		-7.64	-13.00	-2.07	-4.65
		(-0.35)	(-0.60)	(-0.10)	(-0.23)
Observations		130	129	130	129
Adj. R-squared		0.076	0.081	0.062	0.065

This table presents the results of examining the effect of inbound and outbound paper shifting on the informativeness of aggregate domestic and foreign earnings growth. The sample contains quarterly data from Q1: 1988 to Q4: 2021, except the quarterly data in 2020. All variables except $Shift\_rank_q$ are measured as residuals from autoregressive models of different orders (i.e., AR(1) and AR(2)). I use sales as the earnings deflator in Columns (1) and (2) and market value as the earnings deflator in Columns (3) and (4). ***, **, * denote significance at the 0.01, 0.05, and 0.10 levels (two-tailed). Appendix B provides complete variable definition.

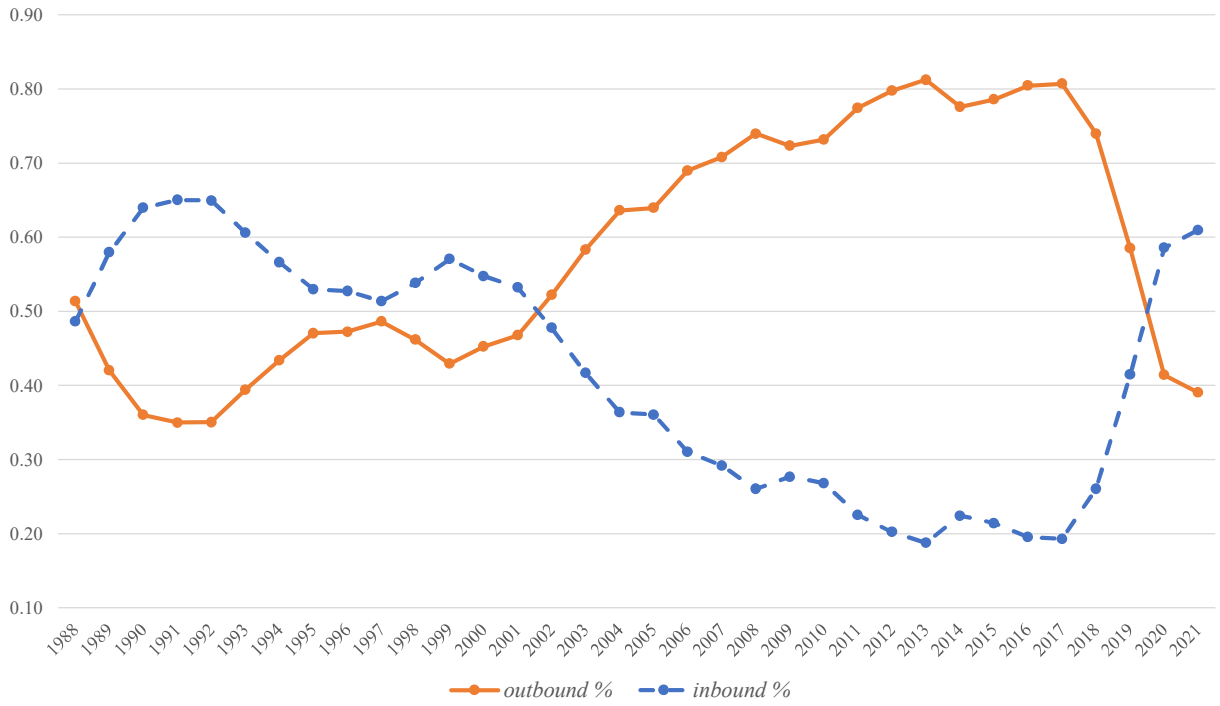
FIGURES

Figure 1.1: U.S. Multinationals' Income Shifting Incentive Over Time



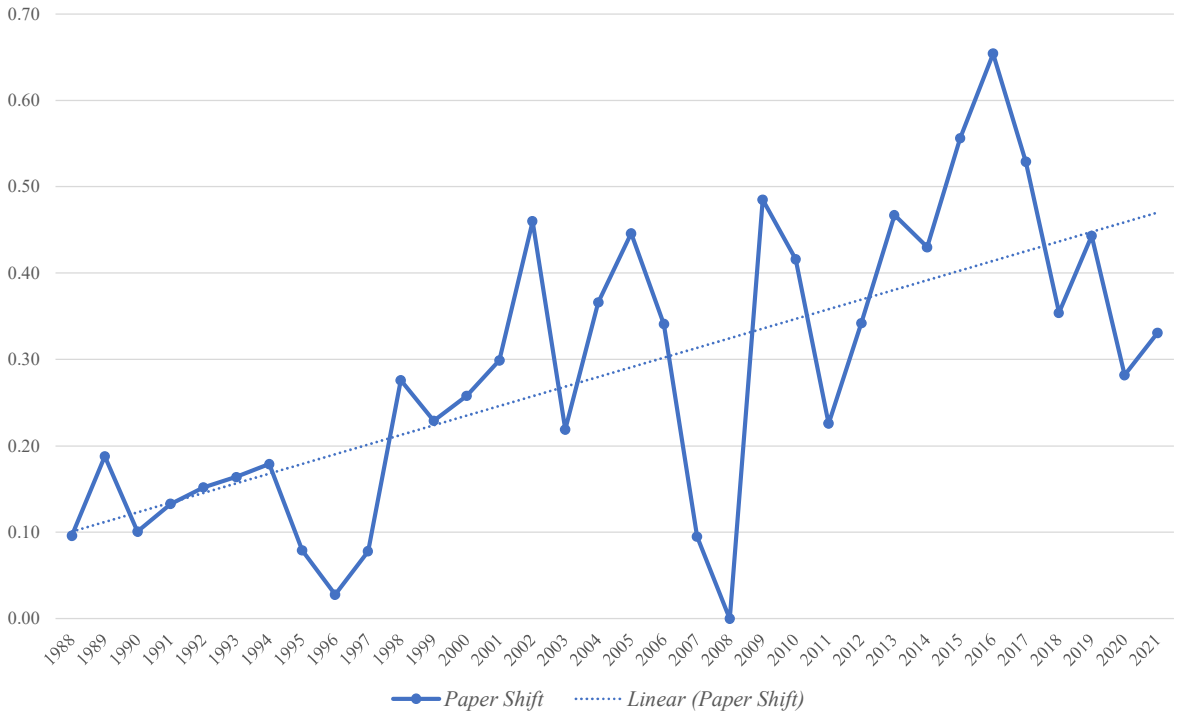
This figure presents U.S. MNCs' income shifting incentive which is measured with $FTR\_AVE_{i,t}$.

Figure 1.2: Percentages of U.S. Multinationals with Outbound and Inbound Income Shifting Incentives Over Time



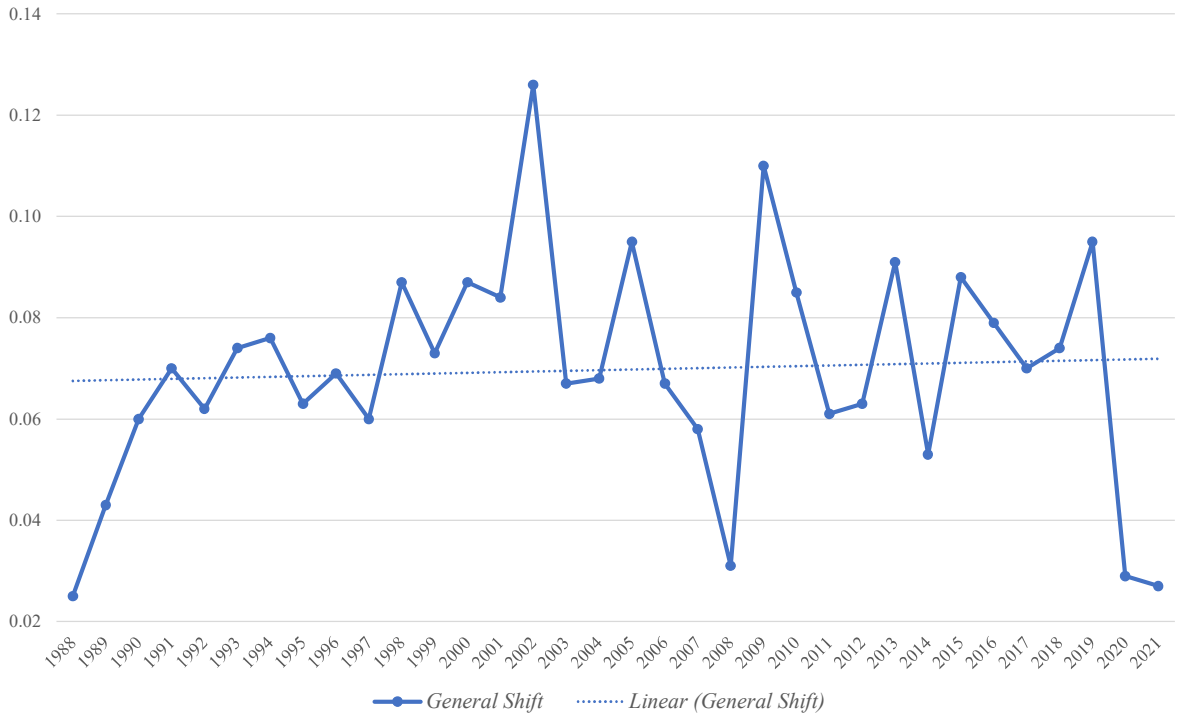
This figure presents the percentages of U.S. MNCs with outbound ($FTR\_AVE_{i,t} > 0$) and inbound ($FTR\_AVE_{i,t} < 0$) income shifting incentives.

Figure 2.1: U.S. Multinationals' Paper Shifting By Year



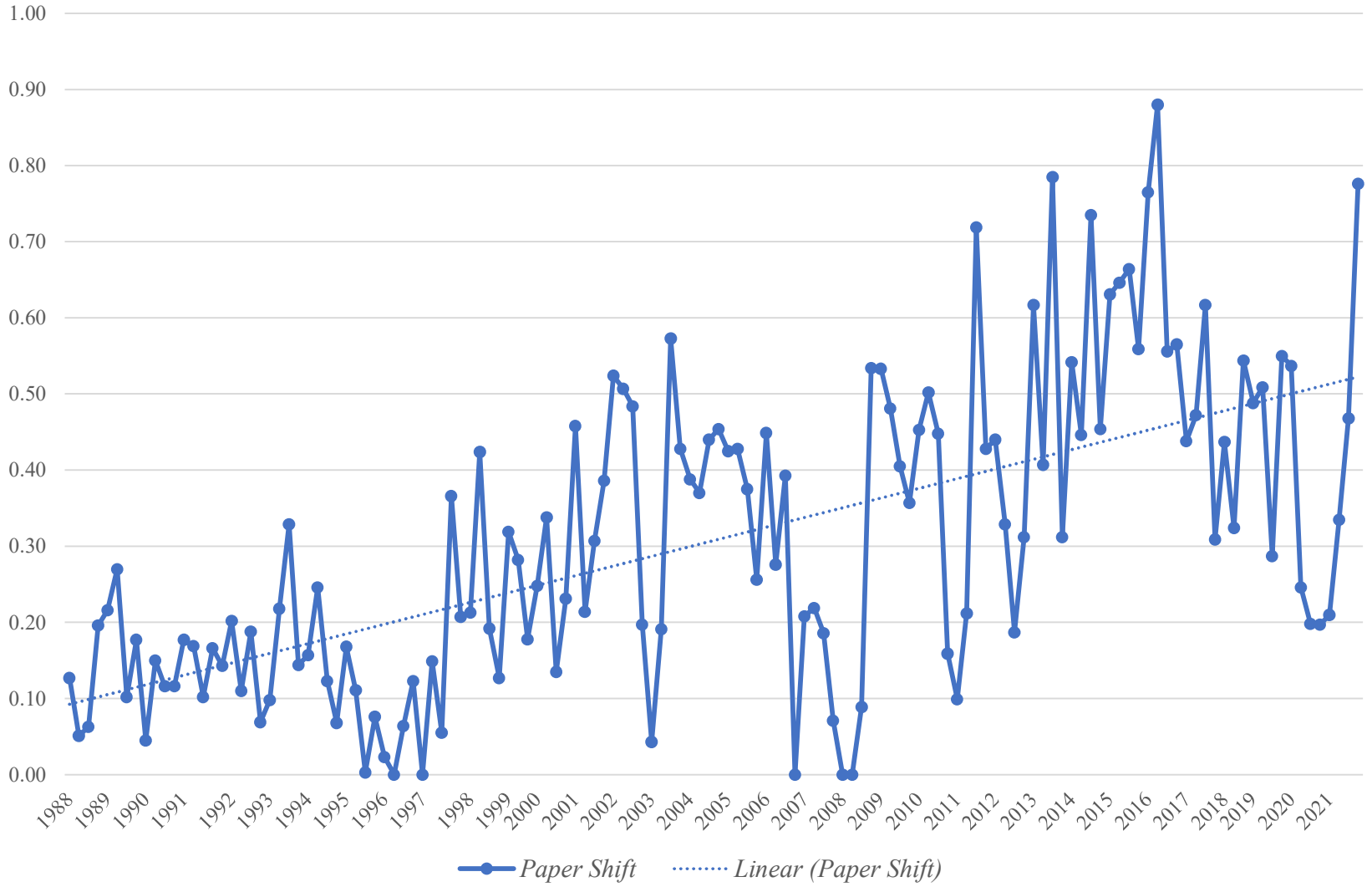
This figure presents paper shifting by year for U.S. MNCs from 1988 to 2021.

Figure 2.2: U.S. Multinationals' General Income Shifting By Year



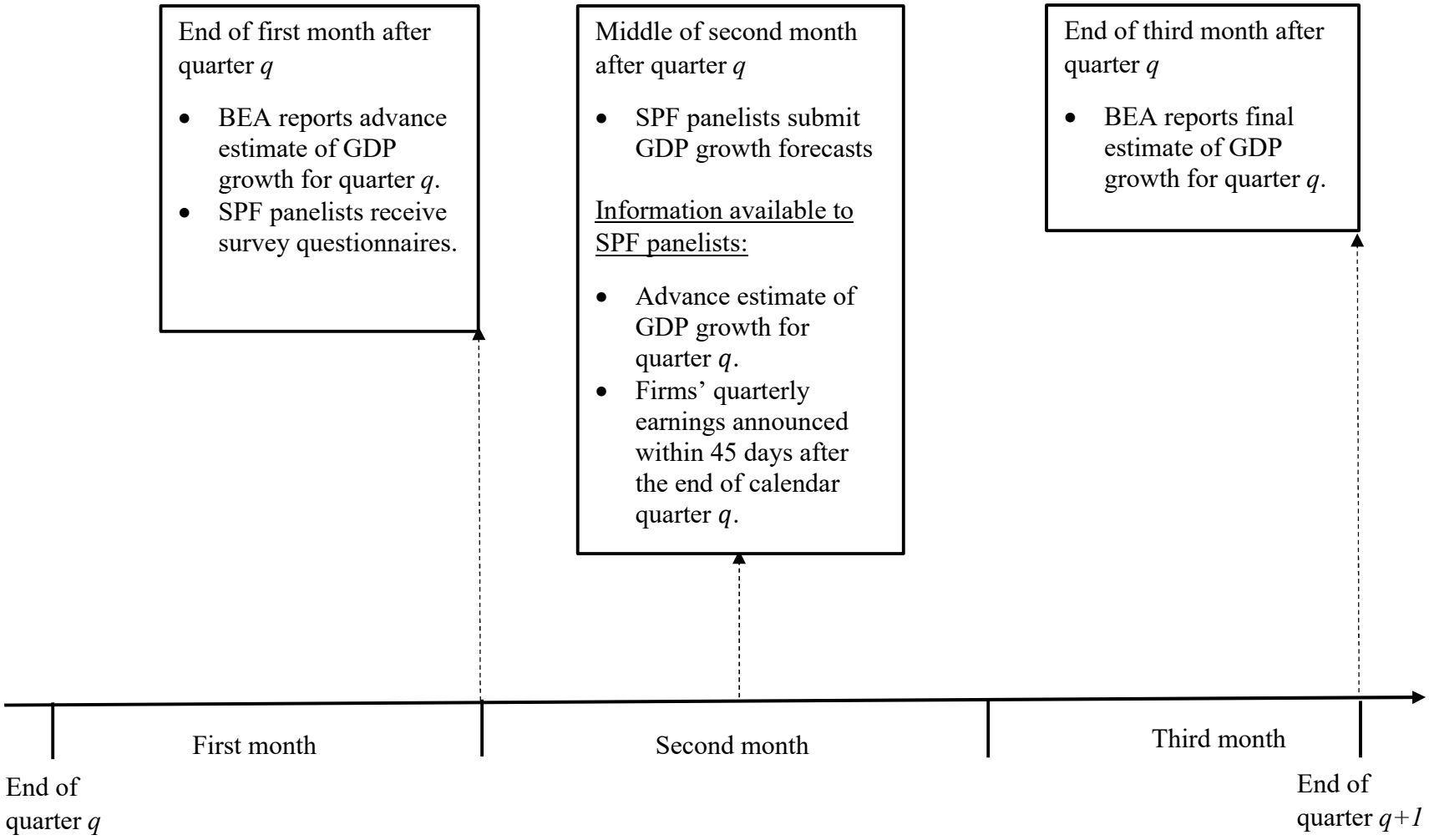
This figure presents general income shifting by year for U.S. MNCs from 1988 to 2021.

Figure 3.1: U.S. Multinationals' Quarterly Paper Shifting Over Time



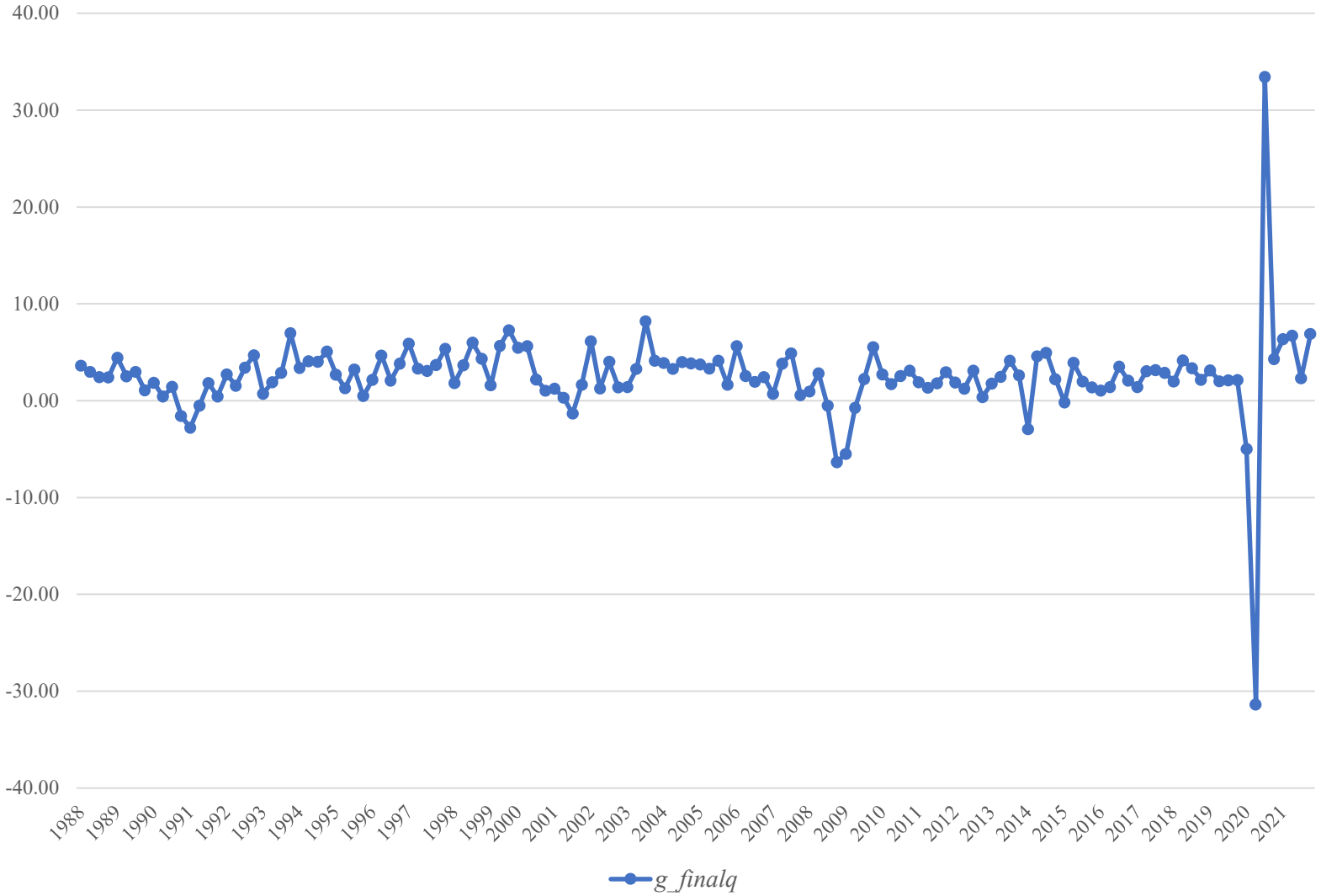
This figure presents quarterly paper shifting for U.S. MNCs from 1988 to 2021.

Figure 4.1: Timeline of GDP Growth Estimates and Forecasts



This figure presents the timeline of GDP growth estimates and forecasts. It is based on Figure 2 of Konchitchki and Patatoukas (2014a).

Figure 5.1: U.S. Realized Real GDP Growth Over Time



This figure presents the final estimate of U.S. realized real GDP growth from 1988 to 2021.

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APPENDIX A: EXCERPTS FROM NIKE'S 2016 AND 2015 ANNUAL REPORTS

Figure A.1: Excerpts From Nike's 2016 and 2015 Annual Reports

NOTE 9 — Income Taxes

Income before income taxes is as follows:

(In millions)	Year Ended May 31, 2016	2015	2014
Income before income taxes:			
United States	$ 956	$ 1,967	$ 3,066
Foreign	3,667	2,238	478
TOTAL INCOME BEFORE INCOME TAXES	**$ 4,623**	**$ 4,205**	**$ 3,544**

NOTE 17 — Operating Segments and Related Information

Revenues and Long-Lived Assets by Geographic Area

After allocation of revenues for Global Brand Divisions, Converse and Corporate to geographical areas based on the location where the sales originated, revenues by geographical area are essentially the same as reported above for the NIKE Brand operating segments with the exception of the United States. Revenues derived in the United States were $15,304 million, $14,180 million and $12,711 million for the years ended May 31, 2016, 2015 and 2014, respectively. The Company's largest concentrations of long-lived assets primarily consist of the Company's world headquarters and distribution facilities in the United States and distribution facilities in Belgium, China and Japan. Long-lived assets attributable to operations in the United States, which are primarily composed of net property, plant & equipment, were $2,241 million and $1,877 million at May 31, 2016 and 2015, respectively. Long-lived assets attributable to operations in Belgium were $348 million and $234 million at May 31, 2016 and 2015, respectively. Long-lived assets attributable to operations in China were $240 million and $267 million at May 31, 2016 and 2015, respectively. Long-lived assets attributable to operations in Japan were $223 million and $205 million at May 31, 2016 and 2015, respectively.

Major Customers

No customer accounted for 10% or more of the Company's net revenues during the years ended May 31, 2016, 2015 and 2014.

NOTE 18 — Operating Segments and Related Information

Revenues and Long-Lived Assets by Geographic Area

After allocation of revenues for Global Brand Divisions, Converse and Corporate to geographical areas based on the location where the sales originated, revenues by geographical area are essentially the same as reported above under operating segments with the exception of the United States. Revenues derived in the United States were $14,180 million, $12,711 million and $11,385 million for the years ended May 31, 2015, 2014 and 2013, respectively. The Company's largest concentrations of long-lived assets primarily consist of the Company's world headquarters and distribution facilities in the United States and distribution facilities in Japan, Belgium and China. Long-lived assets attributable to operations in the United States, which are primarily composed of net property, plant & equipment, were $1,877 million and $1,652 million at May 31, 2015 and 2014, respectively. Long-lived assets attributable to operations in Japan were $205 million and $258 million at May 31, 2015 and 2014, respectively. Long-lived assets attributable to operations in Belgium were $234 million and $175 million at May 31, 2015 and 2014, respectively. Long-lived assets attributable to operations in China were $267 million and $234 million at May 31, 2015 and 2014, respectively.

Major Customers

No customer accounted for 10% or more of the Company's net revenues during the years ended May 31, 2015, 2014 and 2013.

This appendix provides excerpts from Nike's 2016 (year ended May 31, 2016) and 2015 (year ended May 31, 2015) annual reports.

APPENDIX B: VARIABLE DEFINITIONS

Table B.1: Variable Definitions

	Definition
g_final_{q+1}	The final estimate of real GDP growth for quarter $q+1$ collected from the Real-Time Data Research Center of the Federal Reserve Bank of Philadelphia.
$res\_g\_final_{q+1}$	Residuals from the model AR(1): $g\_final_{q+1} = \beta_0 + \beta_1 g\_final_q + \varepsilon_{q+k}$ or AR(2): $g\_final_{q+1} = \beta_0 + \beta_1 g\_final_q + \beta_2 g\_final_{q-1} + \varepsilon_{q+k}$
g_adv_q	The advance estimate of real GDP growth for quarter q collected from the Real-Time Data Research Center of the Federal Reserve Bank of Philadelphia.
$res\_g\_adv_q$	Residuals from the model AR(1): $g\_adv_q = \beta_0 + \beta_1 g\_adv_{q-1} + \varepsilon_q$ or AR(2): $g\_adv_q = \beta_0 + \beta_1 g\_adv_{q-1} + \beta_2 g\_adv_{q-2} + \varepsilon_q$
inv_final_{q+1}	The final estimate of real business investment growth for quarter $q+1$ collected from the Real-Time Data Research Center of the Federal Reserve Bank of Philadelphia.
$res\_inv\_final_{q+1}$	Residuals from the model AR(1): $inv\_final_{q+1} = \beta_0 + \beta_1 inv\_final_q + \varepsilon_{q+k}$ or AR(2): $inv\_final_{q+1} = \beta_0 + \beta_1 inv\_final_q + \beta_2 inv\_final_{q-1} + \varepsilon_{q+k}$
inv_adv_q	The advance estimate of real business investment growth for quarter q collected from the Real-Time Data Research Center of the Federal Reserve Bank of Philadelphia.
$res\_inv\_adv_q$	Residuals from the model AR(1): $inv\_adv_q = \beta_0 + \beta_1 inv\_adv_{q-1} + \varepsilon_q$ or AR(2): $inv\_adv_q = \beta_0 + \beta_1 inv\_adv_{q-1} + \beta_2 inv\_adv_{q-2} + \varepsilon_q$
emp_final_{q+1}	The final estimate of the growth in nonfarm payroll employment for quarter $q+1$ collected from the Real-Time Data Research Center of the Federal Reserve Bank of Philadelphia.
$res\_emp\_final_{q+1}$	Residuals from the model AR(1): $emp\_final_{q+1} = \beta_0 + \beta_1 emp\_final_q + \varepsilon_{q+k}$ or AR(2): $emp\_final_{q+1} = \beta_0 + \beta_1 emp\_final_q + \beta_2 emp\_final_{q-1} + \varepsilon_{q+k}$
emp_adv_q	The advance estimate of the growth in nonfarm payroll employment for quarter q collected from the Real-Time Data Research Center of the Federal Reserve Bank of Philadelphia.
$res\_emp\_adv_q$	Residuals from the model AR(1): $emp\_adv_q = \beta_0 + \beta_1 emp\_adv_{q-1} + \varepsilon_q$ or AR(2): $emp\_adv_q = \beta_0 + \beta_1 emp\_adv_{q-1} + \beta_2 emp\_adv_{q-2} + \varepsilon_q$
con_final_{q+1}	The final estimate of the growth in real personal consumption expenditures for quarter $q+1$ collected from the Real-Time Data Research Center of the Federal Reserve Bank of Philadelphia.
$res\_con\_final_{q+1}$	Residuals from the model AR(1): $con\_final_{q+1} = \beta_0 + \beta_1 con\_final_q + \varepsilon_{q+k}$ or AR(2): $con\_final_{q+1} = \beta_0 + \beta_1 con\_final_q + \beta_2 con\_final_{q-1} + \varepsilon_{q+k}$
con_adv_q	The advance estimate of the growth in real personal consumption expenditures for quarter q collected from the Real-Time Data Research Center of the Federal Reserve Bank of Philadelphia.

Table B.1 (cont'd)

$res\_con\_adv_q$	Residuals from the model AR(1): $con\_adv_q = \beta_0 + \beta_1 con\_adv_{q-1} + \varepsilon_q$ or AR(2): $con\_adv_q = \beta_0 + \beta_1 con\_adv_{q-1} + \beta_2 con\_adv_{q-2} + \varepsilon_q$
$Shift_t$	Annual paper shifting measure equal to α_2 obtained by estimating the following equation for each year: $FRoFA_{i,t} = \alpha_0 + \alpha_1 RoFA_{i,t} + \alpha_2 FTR\_AVE_{i,t} + Industry\ FE + \varepsilon_{i,t}$ if α_2 is positive, and zero otherwise.
$Shift_q$	Quarterly paper shifting measure equal to α_2 obtained by estimating the following equation for each quarter: $FRoFA_{i,q} = \alpha_0 + \alpha_1 RoFA_{i,q} + \alpha_2 FTR\_AVE_{i,q} + Industry\ FE + \varepsilon_{i,t}$ if α_2 is positive, and zero otherwise.
$Shift\_rank_q$	A scaled rank variable for $Shift_q$ ranging from zero to one by dividing $Shift_q$ into quintiles, with observations in the lowest quintile equal to zero and observations in the highest quintile equal to one.
$InShift_q$	Quarterly inbound paper shifting measure equal to α_3 obtained by estimating the following equation for each quarter: $FRoFA_{i,q} = \alpha_0 + \alpha_1 RoFA_{i,q} + \alpha_2 HighFTR\_AVE_{i,q} + \alpha_3 LowFTR\_AVE_{i,q} \times FTR\_AVE_{i,q} + \alpha_4 HighFTR\_AVE_{i,q} \times FTR\_AVE_{i,q} + Industry\ FE + \varepsilon_{i,q}$ if α_3 is positive, and zero otherwise.
$InShift\_rank_q$	A scaled rank variable for $InShift_q$ ranging from zero to one by dividing $InShift_q$ into quintiles, with observations in the lowest quintile equal to zero and observations in the highest quintile equal to one.
$OutShift_q$	Quarterly inbound paper shifting measure equal to α_4 obtained by estimating the following equation for each quarter: $FRoFA_{i,q} = \alpha_0 + \alpha_1 RoFA_{i,q} + \alpha_2 HighFTR\_AVE_{i,q} + \alpha_3 LowFTR\_AVE_{i,q} \times FTR\_AVE_{i,q} + \alpha_4 HighFTR\_AVE_{i,q} \times FTR\_AVE_{i,q} + Industry\ FE + \varepsilon_{i,q}$ if α_4 is positive, and zero otherwise.
$OutShift\_rank_q$	A scaled rank variable for $OutShift_q$ ranging from zero to one by dividing $OutShift_q$ into quintiles, with observations in the lowest quintile equal to zero and observations in the highest quintile equal to one.
$\Delta earn_q$	Value-weighted cross-sectional averages of the year-over-year change in $earn_{i,q}$ ($\Delta earn_{i,q}$) with weights based on market capitalization as of the beginning of each quarter. $earn_{i,q}$ equals quarterly pretax income (PIQ) scaled by sales (SALEQ) or market value of equity (CSHOQ×PRCCQ).
$res\_\Delta earn_q$	Residuals from the model AR(1): $\Delta earn_q = \beta_0 + \beta_1 \Delta earn_{q-1} + \varepsilon_q$ or AR(2): $\Delta earn_q = \beta_0 + \beta_1 \Delta earn_{q-1} + \beta_2 \Delta earn_{q-2} + \varepsilon_q$

Table B.1 (cont'd)

$\Delta earn\_dom_q$	Value-weighted cross-sectional averages of the year-over-year change in $earn\_dom_{i,q}$ ($\Delta earn\_dom_{i,q}$) with weights based on market capitalization as of the beginning of each quarter. $earn\_dom_{i,q}$ equals quarterly pretax domestic income scaled by sales (SALEQ) or market value of equity (CSHOQ×PRCCQ). Quarterly pretax domestic income is estimated by available annual information (i.e., use the most recent annual information to impute amounts for current year Q1-Q3). $$quarterly\ pretax\ domestic\ income = quarterly\ pretax\ income\ (PIQ) \times \frac{annual\ pretax\ domestic\ income\ (PIDOM)}{annual\ pretax\ income\ (PI)}$$
$res\_\Delta earn\_dom_q$	Residuals from the model AR(1): $\Delta earn\_dom_q = \beta_0 + \beta_1\, \Delta earn\_dom_{q-1} + \varepsilon_q$ or AR(2): $\Delta earn\_dom_q = \beta_0 + \beta_1\, \Delta earn\_dom_{q-1} + \beta_2\, \Delta earn\_dom_{q-2} + \varepsilon_q$
$\Delta earn\_for_q$	Value-weighted cross-sectional averages of the year-over-year change in $earn\_for_{i,q}$ ($\Delta earn\_for_{i,q}$) with weights based on market capitalization as of the beginning of each quarter. $earn\_for_{i,q}$ equals quarterly pretax foreign income scaled by sales (SALEQ) or market value of equity (CSHOQ×PRCCQ). Quarterly pretax foreign income is estimated by available annual information (i.e., use the most recent annual information to impute amounts for current year Q1-Q3). $$quarterly\ pretax\ foreign\ income = quarterly\ pretax\ income\ (PIQ) \times \frac{annual\ pretax\ foreign\ income\ (PIFO)}{annual\ pretax\ income\ (PI)}$$
$res\_\Delta earn\_for_q$	Residuals from the model AR(1): $\Delta earn\_for_q = \beta_0 + \beta_1\, \Delta earn\_for_{q-1} + \varepsilon_q$ or AR(2): $\Delta earn\_for_q = \beta_0 + \beta_1\, \Delta earn\_for_{q-1} + \beta_2\, \Delta earn\_for_{q-2} + \varepsilon_q$
$E_q(g_{q+1})$	Mean consensus Survey of Professional Forecasters (SPF) forecast of real GDP growth for quarter $q+1$ as of quarter q.
$res\_E_q(g_{q+1})$	Residuals from the model AR(1): $E_q(g_{q+1}) = \beta_0 + \beta_1 E_{q-1}(g_q) + \varepsilon_q$ or AR(2): $E_q(g_{q+1}) = \beta_0 + \beta_1\, \Delta E_{q-1}(g_q) + \beta_2\, \Delta E_{q-2}(g_{q-1}) + \varepsilon_q$
inf_q	Producer Price Index growth (PPI) from the Bureau of Labor Statistics (BLS). I convert the monthly series to a quarterly series using a three-month average.
res_inf_q	Residuals from the model AR(1): $inf_q = \beta_0 + \beta_1 inf_{q-1} + \varepsilon_q$ or AR(2): $inf_q = \beta_0 + \beta_1 inf_{q-1} + \beta_2 inf_{q-2} + \varepsilon_q$
Additional Variables not defined above	
$FRoFA_{i,t}$	Annual pretax foreign income (PIFO) divided by foreign fixed assets.
$FRoFA_{i,q}$	Quarterly pretax foreign income divided by foreign fixed assets. Quarterly pretax foreign income and foreign fixed assets are estimated by available annual information (i.e., use the most recent annual information to impute amounts for current year Q1-Q3). $$quarterly\ pretax\ foreign\ income = quarterly\ pretax\ income\ (PIQ) \times \frac{annual\ pretax\ foreign\ income\ (PIFO)}{annual\ pretax\ income\ (PI)}$$ $$quarterly\ foreign\ \text{fixed assets} = quarterly\ fixed\ assets\ (PPENTQ) \times \frac{annual\ foreign\ fixed\ assets}{annual\ fixed\ assets\ (PPENT)}$$

Table B.1 (cont'd)

$FRoS_{i,t}$	Annual pretax foreign income (PIFO) divided by foreign sales. The data of foreign sales is obtained from Compustat segment file.
$FTR\_AVE_{i,t}$	Annual foreign tax rate differential calculated as: $FTR\_AVE_{i,t} = \frac{1}{3} \times \sum_{m=0}^{2} \tau_{US,t-m} - \sum_{m=0}^{2} TE_{f,i,t-m} / \sum_{m=0}^{2} PTI_{f,i,t-m}$ where $TE_{i,t}$ is the total foreign tax expense (TXFO+TXDFO) reported by firm i in in year t, $PTI_{i,t}$ is the pretax foreign income (PIFO) reported for firm i in year t. Firm-years with three-year cumulative domestic or foreign pretax losses are removed because it is difficult to determine their income shifting incentives. $FTR\_AVE_{i,t}$ is winsorized at one and negative one to mitigate the impact of outliers or extreme measurement error (Collins et al. 1998; Klassen and Laplante 2012a).
$FTR\_AVE_{i,q}$	Quarterly foreign tax rate differential estimated using annual foreign tax rate differential (i.e., use the most recent annual information to impute amounts for current year Q1-Q3). $FTR\_AVE_{i,q} = FTR\_AVE_{i,t}$
$LowFTR\_AVE_{i,q}$	An indicator variable equal to one if the value of $FTR\_AVE_{i,q}$ is less than or equal to zero, and zero otherwise.
$HighFTR\_AVE_{i,q}$	An indicator variable equal to one if the value of $FTR\_AVE_{i,q}$ is greater than zero, and zero otherwise.
$RoFA_{i,t}$	Worldwide pretax income (PI) divided by worldwide fixed assets (PPENT) of firm i in year t.
$RoFA_{i,q}$	Worldwide pretax income (PIQ) divided by worldwide fixed assets (PPENTQ) of firm i in quarter t.
$RoS_{i,t}$	Worldwide pretax income (PI) divided by worldwide sales (SALE) of firm i in year t.
$Ability_{i,t}$	An indicator variable equal to one for observations in the top half of the sample, and zero otherwise when intangible intensity ($IntanIn_{i,t}$) and tax haven use intensity ($HavenIn_{i,t}$) are used as the proxies for paper shifting ability. An indicator variable equal to the value of $HighTech_{i,t}$ when the membership in the high technology industry ($HighTech_{i,t}$) is used as the proxy for paper shifting ability.
$IntanIn_{i,t}$	The sum of R&D (XRD) and advertising expense (XAD) over three years scaled by sales (SALE).
$HavenIn_{i,t}$	The number of subsidiaries in haven countries divided by the total number of subsidiaries. The data of subsidiaries in haven countries is obtained from Scott Dyreng's website
$HighTech_{i,t}$	An indicator variable equal to one for firms in the following SIC three-digit codes: 283, 357, 360-368, 481, 737, and 873, and zero otherwise.
Compustat data items are in parentheses.	

APPENDIX C: EXAMPLES OF GEOGRAPHIC ASSETS DISCLOSURES AND STEPS OF IMPUTATION

I use public geographic assets disclosures to construct foreign return on fixed assets. In geographic assets disclosures, some multinational companies (MNCs) disclose U.S. and foreign long-lived assets, while others disclose U.S. and foreign property, plant, and equipment (PPE) or general assets. ASC 280 defines long-lived assets as long-term assets other than financial instruments, long-term customer relationships of a financial institution, mortgage and other servicing rights, deferred policy acquisition costs, and deferred tax assets. PPE include tangible fixed property. General assets include tangible and intangible assets that are used or directly associated with business segments. Among Compustat MNCs that disclose geographic assets, I observe in untabulated analyses approximately 36%, 32%, and 32% of MNCs disclose long-lived assets, PPE, and general assets, respectively. Below are examples of different types of geographic assets disclosure.

Figure C.1: Disclosure of Long-lived Assets - Johnson & Johnson's 2016 Annual Report

(Dollars in Millions)	Sales to Customers			Long-Lived Assets[6]	
	2016	2015	2014	2016	2015
United States	$37,811	35,687	34,782	$36,934	36,609
Europe	15,770	15,995	18,947	21,996	20,167
Western Hemisphere excluding U.S.	5,734	6,045	7,160	2,961	2,881
Asia-Pacific, Africa	12,575	12,347	13,442	2,512	2,493
Segments total	71,890	70,074	74,331	64,403	62,150
General corporate				1,190	1,148
Other non long-lived assets				75,615	70,113
Worldwide total	**$71,890**	**70,074**	**74,331**	**$141,208**	**133,411**

(6) Long-lived assets include property, plant and equipment, net for 2016, and 2015 of $15,912 and $15,905, respectively, and intangible assets and goodwill, net for 2016 and 2015 of $49,681 and $47,393, respectively.

Figure C.2: Disclosure of Property, Plant, and Equipment – Facebook's 2016 Annual Report

	December 31,	
	2016	2015
Property and equipment, net:		
United States	$ 6,793	$ 4,498
Rest of the world [1]	1,798	1,189
Total property and equipment, net	$ 8,591	$ 5,687

(1) As of December 31, 2016, property and equipment, net in Sweden no longer exceeded 10% of our total property and equipment, net. As of December 31, 2015, such balance was $713 million. Other than disclosed, no individual country exceeded 10% of our total property and equipment, net for any period presented.

Figure C.3: Disclosure of General Assets – H&R Block's 2016 Annual Report

Our international operations contributed $209.8 million, $231.7 million and $232.2 million in revenues for fiscal years 2016, 2015 and 2014, respectively. The carrying value of assets held outside the U.S. totaled $527.1 million, $284.5 million and $303.9 million as of April 30, 2016, 2015 and 2014, respectively.

I take the following steps to impute foreign fixed assets for firms that do not disclose foreign PPE but disclose foreign long-lived assets or general assets:

(1) If a firm discloses U.S. and foreign long-lived assets, and the sum of U.S. and foreign long-lived assets is within 5% of consolidated PPE, I use U.S. and foreign long-lived assets to measure U.S. and foreign fixed assets. 34% of firms that disclose U.S. and foreign long-lived assets meet this requirement.

(2) If a firm discloses U.S. and foreign long-lived assets, but the sum of U.S. and foreign long-lived assets is not within 5% of consolidated PPE, I use the ratio of U.S. or foreign long-lived assets to total long-lived assets to allocate consolidated PPE to U.S. and foreign fixed assets. This method assumes that PPE and other long-lived assets have similar proportions across U.S. and foreign operations.

(3) If a firm does not disclose U.S. and foreign long-lived assets but discloses U.S. and foreign general assets, I use the ratio of U.S. or foreign general assets to total general assets to allocate consolidated PPE to U.S. and foreign fixed assets. This method assumes that PPE and other general assets have similar proportions across U.S. and foreign operations. Because general assets include tangible and intangible assets that are either short-term or long-term in nature, the sum of U.S. and foreign general assets is not close to consolidated PPE. Therefore, I do not check whether the sum of U.S. and foreign general assets is within 5% of consolidated PPE as I do for long-lived assets.

APPENDIX D: AGGREGATE PRETAX ACCOUNTING EARNINGS GROWTH AND FUTURE GDP GROWTH

Table D.1: Aggregate Pretax Accounting Earnings Growth and Future GDP Growth

$$res\_g\_final_{q+1} = \alpha + \beta_1 res\_\Delta earn_q + \gamma_1 res\_g\_adv_q + \gamma_2 res\_Inf_q + \varepsilon_{q+1}$$

Earnings Deflator		**(1)**	**(2)**	**(3)**	**(4)**
		Sales		**Market Value**	
Autoregressive Model	**Predicted Sign**	**AR(1)**	**AR(2)**	**AR(1)**	**AR(2)**
Constant		-0.023	-0.013	-0.015	-0.006
		(-0.12)	(-0.07)	(-0.08)	(-0.03)
res_Δearn $_q$	+	3.465	1.919	-23.107	-25.455
		(0.17)	(0.09)	(-1.12)	(-1.23)
res_g_adv $_q$		-0.064	-0.068	-0.046	-0.050
		(-0.49)	(-0.52)	(-0.36)	(-0.39)
res_Inf $_q$		0.207	-1.253	0.926	-0.552
		(0.01)	(-0.04)	(0.03)	(-0.02)
Observations		130	129	130	129
Adj. R-squared		-0.021	-0.021	-0.010	-0.007

This table presents the results of examining the informativeness of aggregate pretax accounting earnings growth for future GDP growth. The sample contains quarterly data from Q1: 1988 to Q4: 2021, except the quarterly data in 2020. All variables are measured as residuals from autoregressive models of different orders (i.e., AR(1) and AR(2)). I use sales as the earnings deflator in Columns (1) and (2) and market value as the earnings deflator in Columns (3) and (4). ***, **, * denote significance at the 0.01, 0.05, and 0.10 levels (two-tailed). Appendix B provides complete variable definitions.

APPENDIX E: BUSINESS INVESTMENT, EMPLOYMENT, AND PERSONAL CONSUMPTION

Table E.1: Aggregate Domestic and Foreign Earnings Growth and Future Growth in Business Investment, Employment, and Personal Consumption

$$res\_inv\_final_{q+1}\ (or\ res\_emp\_final_{q+1}\ \ or\ res\_con\_final_{q+1}) = \alpha + \beta_1 res\_\Delta earn\_dom_q + \beta_2 res\_\Delta earn\_for_q + \gamma_1 res\_inv\_adv_q\ (or\ res\_emp\_adv_q\ or\ res\_con\_adv_q) + \gamma_2 res\_inf_q + \varepsilon_{q+1}$$

Future Macroeconomic Outcome		(1) Business Investment	(2) Business Investment	(3) Employment	(4) Employment	(5) Personal Consumption	(6) Personal Consumption
Autoregressive Model	**Predicted Sign**	**AR(1)**	**AR(2)**	**AR(1)**	**AR(2)**	**AR(1)**	**AR(2)**
Constant		-0.025	-0.117	0.000	0.000	-0.015	0.003
		(-0.04)	(-0.19)	(0.00)	(0.00)	(-0.07)	(0.01)
res_Δearn_dom $_q$	+	564.384 **	597.311 **	93.232 **	100.504 **	109.039 *	122.718 *
		(2.06)	(2.31)	(2.46)	(2.60)	(1.85)	(1.87)
res_Δearn_for $_q$	?	-1546.806 *	-1796.636 **	-179.889	-196.994	-233.822	-309.028
		(-1.67)	(-1.99)	(-1.22)	(-1.41)	(-1.18)	(-1.57)
res_inv_adv $_q$*/res_emp_adv* $_q$*/ res_con_adv* $_q$		-0.111	-0.051	-0.069	-0.057	-0.068	-0.193 *
		(-1.22)	(-0.56)	(-0.43)	(-0.35)	(-0.48)	(-1.76)
res_Inf $_q$		89.587	98.003	2.774	6.352	-25.463	-32.506
		(0.89)	(1.02)	(0.22)	(0.52)	(-1.18)	(-1.47)
Difference between β_1 and β_2		2111.190 **	2393.946 **	273.121 *	297.497 *	342.862 *	431.747 *
		(1.98)	(2.32)	(1.70)	(1.93)	(1.66)	(1.96)
Observations		130	129	132	132	130	129
Adj. R-squared		0.072	0.088	0.025	0.038	0.001	0.034

This table presents the results of examining the informativeness of aggregate domestic and foreign earnings growth for future growth in domestic business investment, employment, and personal consumption. The sample contains quarterly data from Q1: 1988 to Q4: 2021, except the quarterly data in 2020. All variables except $Shift\_rank_q$ are measured as residuals from autoregressive models of different orders (i.e., AR(1) and AR(2)). I use market value as the earnings deflator. ***, **, * denote significance at the 0.01, 0.05, and 0.10 levels (two-tailed). Appendix B provides complete variable definitions.

Table E.2: Effect of Paper Shifting on the Informativeness of Aggregate Domestic and Foreign Earnings Growth

$$res\_inv\_final_{q+1}\ (or\ res\_emp\_final_{q+1}\ \ or\ res\_con\_final_{q+1}) = \alpha + \beta_1 Shift\_rank_q + \beta_2 res\_\Delta earn\_dom_q + \beta_3 Shift\_rank_q \times res\_\Delta earn\_dom_q + \beta_4 res\_\Delta earn\_for_q + \beta_5 Shift\_rank_q \times res\_\Delta earn\_for_q + \gamma_1 res\_inv\_adv_q\ (or\ res\_emp\_adv_q\ or\ res\_con\_adv_q) + \gamma_2 res\_Inf_q + \varepsilon_{q+1}$$

Future Macroeconomic Outcome		**(1)** **Business Investment**	**(2)**	**(3)** **Employment**	**(4)**	**(5)** **Personal Consumption**	**(6)**
Autoregressive Model	**Predicted Sign**	**AR(1)**	**AR(2)**	**AR(1)**	**AR(2)**	**AR(1)**	**AR(2)**
Constant		1.16	0.44	-0.13	-0.14	-0.15	-0.03
		(0.91)	(0.35)	(-0.56)	(-0.63)	(-0.36)	(-0.06)
Shift_rank $_q$		-1.70	-0.49	0.31	0.32	0.34	0.14
		(-0.93)	(-0.28)	(0.82)	(0.88)	(0.55)	(0.22)
res_Δearn_dom $_q$	+	1445.59 ***	1382.19 ***	138.70 **	133.21 **	156.78	192.69
		(3.30)	(3.40)	(2.26)	(2.12)	(1.35)	(1.52)
Shift_rank $_q$ × ***res_Δearn_dom*** $_q$	-	-1722.25 ***	-1542.70 ***	-104.55	-76.29	-89.19	-127.80
		(-2.88)	(-2.77)	(-1.28)	(-0.90)	(-0.56)	(-0.81)
res_Δearn_for $_q$	?	-4133.81 ***	-4501.56 ***	-484.14 *	-478.18 **	-1100.59 ***	-1146.93 ***
		(-3.20)	(-3.62)	(-1.91)	(-2.00)	(-3.34)	(-3.58)
Shift_rank $_q$ × ***res_Δearn_for*** $_q$	?	5635.68 ***	5869.38 ***	673.83 *	621.01 *	1858.85 ***	1775.89 ***
		(3.02)	(3.19)	(1.83)	(1.77)	(3.45)	(3.56)
res_inv_adv $_q$/*res_emp_adv* $_q$/ *res_con_adv* $_q$		-0.22 **	-0.14	-0.08	-0.07	-0.13	-0.25 **
		(-2.58)	(-1.64)	(-0.53)	(-0.42)	(-0.90)	(-2.52)
res_Inf $_q$		80.24	86.19	3.37	6.64	-20.22	-30.95
		(1.11)	(1.24)	(0.32)	(0.62)	(-0.92)	(-1.38)
Combined effect							
β_2+β_3		-276.66	-160.52	34.15	56.93	67.89	64.89
		(-0.83)	(-0.52)	(0.71)	(1.14)	(0.86)	(0.87)
β_4+β_5		1501.87	1367.83	189.69	142.83	758.25 **	628.96 **
		(1.47)	(1.34)	(0.98)	(0.77)	(2.48)	(2.20)
Observations		130	129	132	132	130	129
Adj. R-squared		0.187	0.192	0.046	0.051	0.051	0.079

Table E.2 (cont'd)

This table presents the results of examining the effect of paper shifting on the informativeness of aggregate domestic and foreign earnings growth for future growth in domestic business investment, employment, and personal consumption. The sample contains quarterly data from Q1: 1988 to Q4: 2021, except the quarterly data in 2020. All variables except $Shift\_rank_q$ are measured as residuals from autoregressive models of different orders (i.e., AR(1) and AR(2)). I use market value as the earnings deflator. ***, **, * denote significance at the 0.01, 0.05, and 0.10 levels (two-tailed). Appendix B provides complete variable definitions.